TELEPHONE ENGINEER

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TELEPHONE ENGINEER

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VOL. XXII *Chicago, October, 1919.* *No. 4*

New Rates and Security Values.

DESPITE the increasing resistance of life in general, and the necessity for getting more revenue because everybody else is getting it, the telephone rate "crisis" that existed just a couple of years ago has vanished, probably forever. Though there have been notable exceptions, the average operating company has needed higher rates for a long time, and needed them badly. And the word "needed" in the telephone business means deserved, every time. It means that correct and equitable rates were higher than actual rates. The difficulty in adjusting the matter lay mostly in getting started—in the arbitrary, opinionated objection of the public to paying higher charges, whether they were deserved or not.

This part of the trouble—and it was the greater part—while not ended, is rapidly waning in power. Though there may be a present flock of troubles whose discouraging influence is considerable, most of them are obviously temporary. Most of the companies are not only getting authority for higher rates, but they are collecting them without a fraction of the resistance that hampered any action of the kind before.

By the end of another year we confidently expect the rate situation to be so well matured that the company whose revenue is inadequate will have only its own management to blame. The problem of the standardized rate—a revenue to fit every condition—so mysterious and intricate a few years ago, seems now in a fair way to solution. It is beginning to be recognized by the supervising bodies that a service corporation is more responsible than the public; that a rate that is found to be, by any chance, too high can be rebated, or compensated by a corresponding period of lower rates; while a rate that is too low cannot by any known means be made up later. So the operator can safely be given the benefit of the doubt, if there be any doubt. That is the new sentiment.

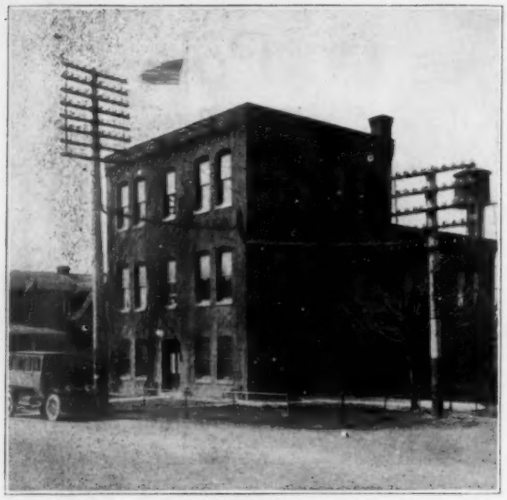
It is plain that such a reaction, when it has matured, will have an excellent effect upon telephone securities. Assurance of an equitable rate means assurance of an equitable return to the investors; and that, in turn, means assurance of a ready disposal of securities at a fair value—ready capital. In the whole range of telephone capitalization the amount of water is quite infinitesimal and there are few complications to scare away the prospective investor. Telephone men, of course, have always known that telephone securities afforded the best kind of investments. In a little while, with proper prices certain, the public will discover it too.

The Division of Toll Revenues.

EXCHANGE rates may be settling gradually down to a basis of mathematical precision, but there are some items of telephone accounting that still remain, apparently, a mystery. One that we have in mind concerns the proper division of toll charges. What is the correct percentage to go to the exchange originating a toll call, and how much should the company owning the long-distance system get, and why? A good deal of thought seems to be centering on those questions lately, and a telephone meeting in Wisconsin last month devoted much time to discussing it; but out of the argument no scientific answer came, and no mathematician has appeared with a prepared book of tables showing where the revenue should be split.

Finding the average cash value of all the tolls collected in a year presents no great difficulty; but few seem to have any definite idea of the actual cost of setting up a completed long-distance connection. The cost varies, of course, between wide limits, from the call that goes through the first time without any trouble, to the one that takes a dozen trial connections before the toll is earned. Nevertheless, there is a definite figure that represents that cost as an average and knowledge of it should be common property among telephone operating men.

It cannot be too strongly emphasized that for every case of this kind, for every condition involving a problem of revenue, there is one certain figure that is correct, and that figure can be found by study. Telephone service, exchange or toll, is a manufactured commodity with a cost that is definite, whether the manufacturer happens to know his own costs or not. And everything that has a cost price has a correct sale price and a correct rate of commission for business. Telephone operators should know not merely their annual costs, but the cost of each and every operation that goes to make up the service they sell.



The building that gives the village of Phoneton, Ohio, its name—the toll exchange of the American Telephone and Telegraph Company. The Phoneton office takes care of trouble on 11,800 miles of wire. There are 172 wires going into the station. Direct lines from the Phoneton office reach from Chicago to Point Pleasant, from St. Louis to Pittsburgh, and from Detroit to Cincinnati. Press reports for the Associated Press, United Press and International News Service are handled, so that all the news of the world passes through its wires. There are 22 employees in the plant department and 21 in the traffic department. The house just beyond the exchange building is the home of the manager, L. B. Manchester, provided by the company. "The Story of Phoneton" appears on another page of this issue.

Strange adventures are befalling wood telephone poles these days, with the highways filled with high-speed autos, and the autos filled with reckless drivers. In one instance, recently encountered, the middle had been knocked out of a pole. The upper end of the pole, still attached to the wires, was hanging high in the air and swaying gently to and fro in the breeze, while the lower part or stump, splintered and bent over, told the story of the violence of the impact. Nothing could be found to eke out the story told by the broken pole, and it is hard to guess why the pole fractured in two places, unless it was weak near the upper end. In that event the wires probably held it rigidly enough to allow the onrushing automobile to break it off at the weak spot, after the lower end had been splintered and separated.

In another case a car collided with a pole of unusually large size and split it in the manner shown,—breaking off one half of the pole at the bottom, and pushing this half away from the unbroken part, so that the whole resembled a gigantic clothespin with one end sticking in the ground. The lower cut shows the pole in greater detail. The car had just come round a right-angled turn in the road. We should not care to estimate its actual speed in miles per hour, but a car running at any speed appropriate to the taking of such a turn could hardly have split a twelve-inch pole in two.—"The Travelers' Standard," published by the Travelers Insurance Company, of Hartford, Conn.

Reinforced Concrete Bases for Poles

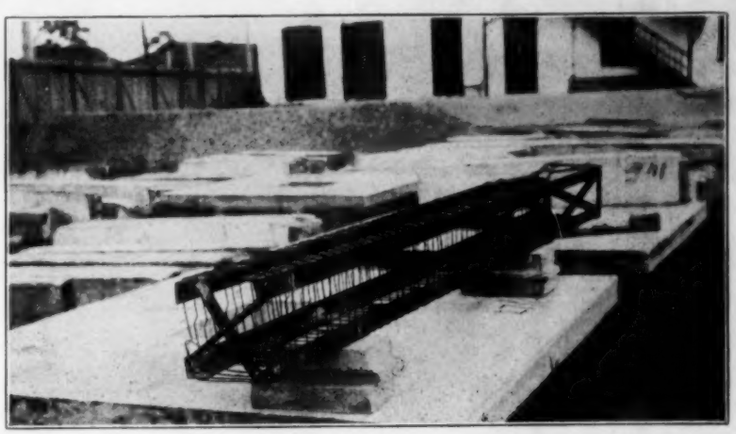
A New Invention that Adds Life to Old Poles and Makes New Ones Better

A SIMPLE invention widely applicable for use in constructing telephone lines and transmission lines, just announced, consists of a base of reinforced concrete in which the regular wood pole is seated.

The reinforced concrete pole base is used to construct a pole having the advantages of all three types of poles with a minimum of the disadvantages of each. It comprises an ordinary wooden pole or shaft, a concrete base and an iron socket for union between the base and the shaft. This secures the benefits of the lightness and strength of the wooden pole in the shaft, the ease of climbing, of working or shaping and the valuable insulating properties. At the same time the advantages of concrete construction at and below the ground level are obtained. This also disposes the weight at the proper point and provides a rigid, non-corrosive, non-rotting material at the surface of the ground. The iron socket performs two functions. It forms first of all a socket for the wooden shaft, and at the same time it forms the reinforcement of the concrete base.

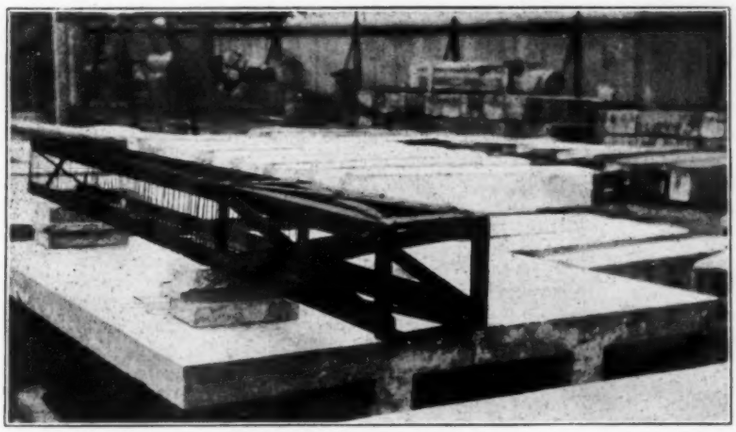
The reinforced pole base comprises a hollow concrete base reinforced by angle iron uprights which protect above the concrete and which, with the hollow base, form a socket for receiving the lower end of a wood pole. To provide the required strength and rigidity the upper part of the angle iron structure is thoroughly braced by strap and angle braces.

The base is set in the ground for a depth of about five feet, so that the top of the base projects above the ground and holds the wood pole well above the ground level The diagrams show longitudinal and cross sections of the pole base and the details of its construction.



Iron work and reinforcing of pole base—lower end

The advantages of the new pole bases are that they provide a strong and lasting foundation for wooden poles. They give a strong and rigid reinforcement of the pole at, and adjacent to, the ground line—the point of greatest strain. Wood poles with reinforced concrete bases are convenient to climb, work and shape. They retain the insulating properties of wood poles. The danger of "hot" poles is eliminated. The concrete construction at and adjacent to the ground line cannot decay or corrode and prevents attacks of boring insects. Insects will not climb the concrete to reach the wooden pole. They avoid duplication of stocks and standard wood pole fittings and fixtures may be used. Complete pole bases or iron-work for pole bases can be transported easily. The bases can be cast at a pole yard or in the pole hole as preferred or as local conditions require, and all manufacutring operations can be performed by unskilled labor.



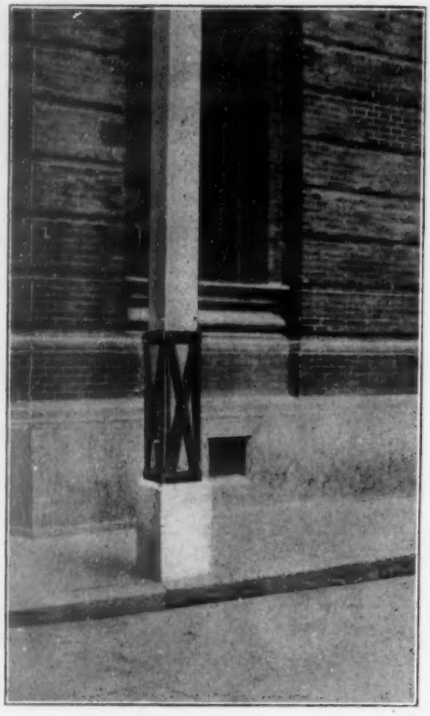
Iron work and reinforcing of pole base—upper end

When used in renewing the base of old poles, the wires or cables attached to the old pole need not be disturbed, the life of the old pole is indefinitely prolonged and its regular height maintained.

The life of the old poles with rotted butts may be indefinitely prolonged by simply sawing them off at the correct height, after temporarily supporting the pole, by removing the old butt from the ground and dropping the new base into the hole. The old pole is then lowered into the socket of the new base. This effects a large saving, as no wires or cables need be disturbed, the life of the old pole is indefinitely prolonged and its regular height maintained.

Owing to the smaller amounts of labor and materials, including iron, cement, sand and broken stone or gravel, the pole base can be made at approximately half the cost of a concrete pole. Taken with the lower cost of handling, installation and maintenance, the ultimate economy of using concrete pole bases with wooden poles is evident. They are thoroughly practicable and have demonstrated their worth under most adverse conditions.

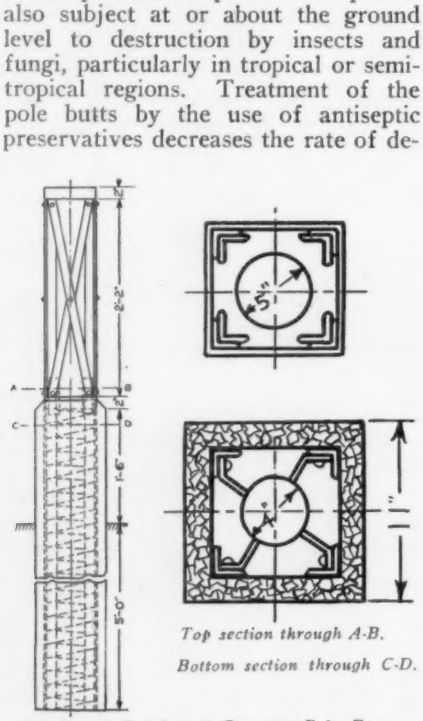
The types of poles and supports in



Pole base in city service

common use today all have certain objectionable features.

The wooden pole is poorly adapted for direct setting in the ground due to the action of the air and moisture at the ground level which cause rotting of the pole at this point. The pole is also subject at or about the ground level to destruction by insects and fungi, particularly in tropical or semi-tropical regions. Treatment of the pole butts by the use of antiseptic preservatives decreases the rate of de-



Top section through A-B.

Bottom section through C-D.

Details of Reinforced Concrete Pole Base.

cay, but is not a decay preventive. Ninety-five per cent of all wood poles are put out of commission by decay alone.

The iron pole is subject to rusting at and below the ground level and, in addition, is expensive and unsatisfactory to install and maintain, due to the requirement of special tools, special pole-line hardware, etc. The iron pole is hard to climb and is dangerous to linemen due to its conductivity.

The concrete pole is unsatisfactory in many respects, as it is expensive, requires special pole-line hardware, and special equipment must be provided for manufacturing, handling, installing and maintaining. Such poles are too heavy to transport and erect with unskilled labor and simple equipment. Concrete is a material which is specially adapted for use at and below the ground level but which is poorly adapted for the shaft of the pole.

Indiana Company to Hold Big Get-Together Meet

Appreciating the fact that the best asset of a public service company is the quality of its service; Frank V. Newman, new manager of the LaPorte, Indiana, Telephone Company, is taking steps to impress the importance of this upon the employes of the firm and for this purpose has arranged a get-together meeting to include employes of other telephone companies in the state. This will be held October 2.

At the afternoon session on the big day, W. S. Vivian, secretary of the United States Independent Telephone Association, and prominent officials from the state organization will be present. The meeting will begin at 2 o'clock and addresses will be made by J. V. Dorland, president of the company, Frank V. Newman manager, and Ralph O. Dorland, secretary and treasurer. The object will be to discuss way and means of improving the telephone service in LaPorte county and on long distance calls.

A social gathering and dance will be held in the evening, for which an orchestra will furnish music. Beginning at 8 o'clock, Mayor Sallwasser and prominent business men will speak briefly on city's interest in good telephone service. Following the speaking, the dance will be held. A number of committees were appointed several days ago to complete arrangements for the big day.

The LaPorte Telephone Company is considering the service problems from a scientific standpoint and has made progress in improving the service in the past six weeks. Miss Mabelle A. Cavanaugh, for a number of years with the Indianapolis Telephone Company, has been engaged to assist Miss Flora Stapleton, chief operator, in handling operating problems and instructing the operators.

It is believed that the get-together meeting will be beneficial, not only in the way of better service, but will bring about a better understanding among the employes of the various telephone companies which operate in connection with the LaPorte Telephone Company.

The committees which have been working to assure success are: Hall—Frank V. Newman and R. O. Dorland; music—Dorothy White, Florence Anderson, Marguerite Norris, W. D. Spore; floor—Adele Arndt, Pearl Troy, Vera Ebel, Lola Blakeman, Mrs. Ethel Swartz, Louis Vandewalker; program—Molly Hoffman, Mrs. Marguerite Wendt, Mildred Ott, Fred Pyle; decoration—Edna Bunton, C. R. Pitzer, Helen Cotter, Harriett Cotter, Mrs. Gladys Kable, Dorothy Stark, Dorothy Collins, Florence Ferguson, Elizabeth Snape and Ruth Siedler; invitation—Flora Stapleton, F. V. Newman, R. O. Dorland; refreshments—Bernice Bowes, Merlin Jones, Mable Haines, Mildred Moran, Bernice Burlingame, Mary Spencer, Edna Rosenbaum, Emma Lucksinger, Ellen Munson and Bessie Berdacky.

Directory Advertisers Litigate

Eight business firms of Houston, Texas, who have their advertisements on the back and front covers of the city telephone directory want their ads to stay on the back and front and they invoked the aid of the courts to keep them there. J. H. Crooker, attorney, representing the eight advertisers who have this space on the telephone directory, filed suit asking for an injunction against the Southwestern Telephone Company and the Westheimer Transfer Company, to prevent them covering up their ads.

According to the petition, the Westheimer Transfer Company "stole a march" on all the advertisers and had made a large number of telephone books, out of stiff cardboard. The telephone book is slipped in this cover, burving the advertisements on the back and front covers. These covers for the telephone books are given away. No advertisement appears on the cover except that of the Westheimer Transfer Company.

Public Relations and the Manager

Prepared for the Managers of the Texas Telephone Company by Its President

By E. C. BLOMEYER

SOME of you may think this "public relations" stuff is mostly "bunk"—and some of you may be just a little bit in doubt as to what we really mean when we speak of "public relations."

I hope to show *you* exactly what we mean by public relations; to convince you that it is actually something tangible and real, and to prove to you that it is important both to you and to the company that you consider this phase of the telephone management in your everyday work.

* * *

Public opinion is a powerful thing.

In the old days a lot of public utility corporations and railroads got themselves "in bad" because they either adhered to the "public be damned" policy, or simply failed to recognize the importance of public opinion.

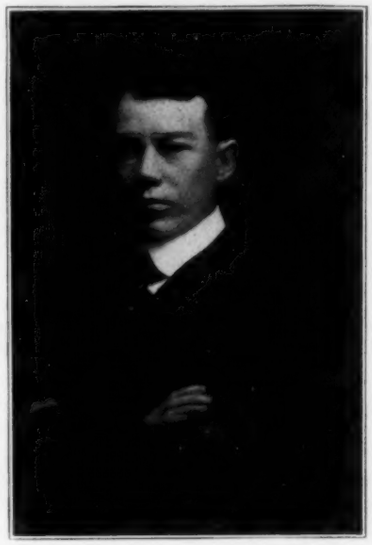
I believe that most of the unreasonable and drastic regulatory laws now on the statute books in many states would never have been enacted had public antagonism against public utility corporations not been aroused by the acts of the companies themselves—acts either of "omission or commission."

The companies were either unfair to the public, or arrogant and overbearing in the administration of their business, and failed to consider the feelings of their patrons when they had to enact rules and promulgate rates. In many cases they had the best of good business reasons for doing what they did—but it was the way they did it that hurt.

Agents and employes of the companies often failed in proper consideration to the public. The railroad agent, for instance, refused to give out information about trains—or gave it out in such a way as to antagonize the traveler. Result—laws in many states compelling a railroad company to mark up every half hour or so, the position of all trains.

In the old days, free from regulation, many utility companies promulgated their rates of their own free will. Perhaps the rates were entirely fair—statistics show, in fact, that in most cases they were—but the utility never bothered much to convince the public that they were fair. Partly as the result, all utilities are now under regulation of some sort—and the most drastic regulation in many cases.

A bad reputation is a hard thing to live down. There is a certain railroad in the East that for years gave "rotten" service. During the past five or six years its service has been materially improved until now it is equal to that offered by most other railroads and better than some. But it is still known to Tom, Dick and Harry as a "rotten" road—and will be for years. It has a bad reputation to live down.



E. C. Blomeyer,
President Texas Telephone Company.

Take our own business: A telephone company that has been mismanaged, or has furnished bad service, or maintained a policy of unfairness to its patrons, must operate for years under the best of management, with all fairness, and give the best of service, before it can outlive the public prejudice against it.

These are facts, as most of us realize.

* * *

"Public relations" is, as the name implies, the maintenance of proper, cordial, fair and friendly relationship between the company and the public it serves.

No matter how good the company's service, no matter how fair its rules, no matter how reasonable its rates—if the administration of its business is tinged with harshness toward its customers, if its employes and agents are impolite, insolent, or lack courtesy and cordiality in dealing with the public, that company is pretty certain to be "in bad" in a lot of ways all the time.

To be "in bad" in such a way not only costs money—it costs in energy, time and in many other ways.

In your town there might possibly be politicians who, always on the lookout for a "whack" at a public utility—if such a whack will be popular with their constituents—take advantage of a situation like this. Under such conditions they can be actually unfair to the company, not only in matters of rates, but by unfair ordinances and so on—and a public which is "sore" on the company will applaud them.

But—the politician usually "stays off" a company which has the reputation of being fair, square and honest in its dealings with its customers. There is no profit in a political fight which will not bring votes—certainly none in a fight which the public might look upon as an unwarranted persecution of a fair-minded and fair-acting organization, even though it is a "public utility" corporation.

A utility company which has a reputation for being grasping, harsh or unfair has practically no defense in many cases against even unwarranted and unjust attacks upon it by politicians, the newspapers, or those of the public who wish to make capital of one kind or another out of its weakness.

Even in court—before a jury of "twelve good men and true"—such a company is pretty certain to get the worst of the deal, and mostly because it is the popular thing to rap the company.

There are many other reasons for the maintenance of proper "public relations," but from these few illustrations you will see the importance of the proposition to the company.

Later on I will mention its importance to *you*.

* * *

First of all, of course, the company itself must be fair and honest.

Remember, there is always a reason—and usually, I think, a good one and a fair one—for every order issued and for every plan adopted or decision made. Don't jump to the conclusion that a proposition is unfair unless, or until, you know the reason for it, and the facts back of it.

If you need to know them—ask! If for any reason the management is not at liberty to tell you—although I can't think when such a situation has

occurred—we will, at least, endeavor to show you that we are acting for the best of all concerned.

* * *

Next, *you* must be fair—you and the other employes at your exchange. but, above all, you! For you, as manager, are the telephone company in your town!

If you are a "grouch," then the company will seem "grouchy" to the people of your town.

If you are harsh, domineering, overbearing in the administration of the company's affairs in your town, or inconsiderate of the feelings of your patrons, then every rule of the company, no matter how fair, will seem harsh, domineering or overbearing to your patrons.

If you are uninterested in the welfare of the town in which you live, can you blame the citizens for being uninterested in you, or your welfare —or that of your company?

If you are convinced that you don't like the town, or the people in it, is it surprising that they don't like you—or your company? Like or dislike is a hard thing to conceal.

If you believe that your patrons are a bunch of "gougers," hard-heads, knockers, or just plain "nuts"—is it any wonder that they are a little suspicious of you and of the telephone company?

If you are ashamed of the company you are working for, and are accustomed to "run down" its policies, its management, its plant, or business methods, can you or the company blame the people of your town if they don't go out of their way to praise it?

You are the telephone company in your town—*and the company is going to be judged there mostly as you are judged.*

Outside of very exceptional circumstances it lies mostly with you, as manager, whether this company will be popular or unpopular, liked or disliked, in your town or city.

I don't care how fair the company tries to be—a manager who has the wrong outlook can put it "in bad" in his town. I don't care how unfair the company is—the manager who is skilled in the handling of "public relations" can, at least, keep its relations with the public there away from the "breaking point."

Think it over, Mr. Manager!

* * *

"Yeah!" I can hear some of you managers saying. "That all listens good—but I've got a full day's work right now, I guess. How am I going to do all those wonderful things?"

I don't know how you would do it—different men, different ways. But I know how I would do it, were I managing an exchange—and I've got nerve enough to think I could run one again if I were called upon to do it!

I would certainly include in this list the mayor, the councilmen, and all the city officials—and the county officials, if my town was the county seat.

I would know the local newspaper man or men—and be of service to them, when I could. Whenever I ran across a bit of news I would see that they got it for the paper. I would read their paper, and be in position to discuss with them their editorial or news policy—or to compliment them, when occasion warranted, on getting out a good live paper.

I would ask the company to furnish me a membership in the business club, Chamber of Commerce, or whatever the local organization is called—and then I would use that membership. I would attend the meetings; take part in the discussion, when occasion presented; serve on committees, when appointed; and try to be of some real, sincere service to the public-spirited organization that was trying to make my town a better and more prosperous place in which to live.

I would attend local affairs, such as speakings, banquets, or dinners for civic purposes, and so on, and would, in every honorable way possible, identify myself with the civic and other public-spirited or patriotic enterprises of the town.

I would keep in close touch with all the important activities of the town and the people in it, and be of service in them when I could without arousing a partisan spirit, or neglecting my work.

Above all, I would stay away from politics, or any activity that was political, or that caused or might cause dissension between the citizens generally—and I would not side with any certain "clique" or faction such as often exists in towns, small or large. And if anybody "called" me for not taking sides, I would be man enough to remind them that I am in the "public utility business," charged with serving all the people alike—and, consequently I had no right to align myself with any faction and against another.

I would do all these things—and such of the kind as presented themselves to me—not from the purely selfish motive of "boosting" myself or the telephone company, but with the sincere and honest desire to be of service to my town and the people in it—to be a real part and parcel of my town. And I would be somebody in that town, if it took me 27 hours a day to do it!

I would try to convince my fellow citizens of my honesty, sincerity and trustworthiness—and to convince them I would have to be all that. I would show them that I could respect a confidence, do a favor, and tell the truth —for even a telephone man can tell the truth, I believe, if he practices it for a while.

I would try to feel the spirit of a telephone manager I met in a little jerkwater town in West Texas a few weeks ago. He said: "This is a little town, and it's dusty, and windy, and not much to look at—but I'll tell the world that it's the best town of its size on earth!"

* * *

"Yep," you say "that's all O. K.—but I gotta work for the company *some*, and a fellow kind of likes to stick around home at night, every now and then—"

Sure! I got you! I know how good the old rocking chair and the carpet slippers feel myself.

I would never suggest that you neglect the company's business to pound the pavement and slap Bill and John on the back. Nor would I suggest that you neglect the wife and family —never. But—

Every fellow needs to mix it a bit with the other fellows. You know that—and you do it. All I'm suggesting is that you do your mixing with the right crowd—the crowd that can do you some good.

You really don't know how much personal satisfaction there is in getting acquainted the right way with the big men of the town, until you've tried it the right way. Let them see you every now and then when you haven't got a telephone bill in yoiur hand.

It's hard at first to get up an interest in the Commercial Club—hearing the other fellows stand up and talk. But when you get to where you're doing some of the talking—that's better. When you've done a lot of talking yourself, you'll go home thinking what an interesting meeting it was!

You never know a fellow quite so well or so pleasantly as when you've stood shoulder to shoulder with him a few days, selling Liberty Bonds—or on an anti-horse-thief campaign, or something like that. He'll think more of you, too.

And—don't you talk telephone to them when you're out on other business, unless they start it. Forget the telephone business for an hour or two, and put your pep into whatever the job happens to be.

Before long, you'll be calling all the big ones "Jack" or "Pete"—and they'll think of you as "Sam" or whatever

your name is. Then you'll wake up some day to find out that they really know you in that town.

Think it over! Also—

You're not stealing any time from the company when you make the company's manager a bigger man in your town.

Of course there is an extreme to it—no man should neglect his own business for everybody's business—but it's hard for a man to forget his own job so completely as to do that.

* * *

You want people to like you, in your town.

The surest way to get the other fellow to like you—is for you to like him.

We're all more or less cracked or crazy on some subject or other, or in some ways—so don't hold his peculiarity, whatever it is, against him. Then maybe he won't hold yours against you.

Of course, there are the soreheads, and the chronic kickers, and the howlers, and so on in your town—there are some everywhere. But, somehow or another, when a fellow gets to know them pretty well—well, they're not so bad after all.

And, the better you know them, the better shape you are in to convince them that they are wrong, and the more likely they are to listen to you.

It's the little things you do for the other fellow—the little, thoughtful favors—that he'll remember longest.

If his wife is sick—it only takes a minute to call him up and tell of your sympathy. Has there been a death in his family?—that's the time a fellow needs a friend. Has he been given a bigger job?—congratulate him.

The time to acquire friends is *before* you need them, remember—after you need them will be too late.

It may be a task to do these little things at first—to re-remember to do them, rather. But after a while they'll come natural to you—and then you'll be surprised at the pleasure it gives you to do them.

The company is back of you on all these things, Mr. Manager.

I don't mean that this is a license to neglect the real job of furnishing A-1 telephone service and getting the money for it—you know that. I don't believe these other things will interfere in the least with that—as a matter of fact, I believe they make it all the easier.

I don't mean that this is a license to spend a lot of money for public relations purposes, or donate to everything that comes along, or blow in coin on "treats for the gang," or other things like that. That's not the way to do it, anyway.

The right standing in the town makes it all the easier to escape just such things as that, and to do it without criticism.

Nobody has much respect for a fellow who is "easy"; for a fellow who neglects his own business to look after the offairs of others. And friends—real, worth-while friends—can't be bought with money or "treats."

But everybody respects the fellow who attends the right way to his own business, stands up for his own rights and those of the company he represents and, in addition, makes himself of value to the community generally by putting his shoulder to the wheel of civic betterment, who is willing, if necessary, to give some of his own time and energy for the upbuiling of the town in which he lives and for the benefit of others in meritorious ways.

The company will back up such a manager—and will help him in any and all reasonable ways to better himself, his prospects, and his personal standing in his community.

Don't say anything about this, please, but—

I think I can name at least two managers who do not even know the names of the members of their city council. I met one within the past several months who didn't even know the mayor—another, who had been in his town severals years, had nothing but a fighting acquaintance with the local newspaper man.

I met one who never visited a bank, excepting the one where the company keeps its money; who never went in a store—excepting the one where he traded—unless it was to collect a bill.

I spoke of Mr. So-and-So (our manager) to one of the substantial, influential business men of one town, and he asked, "Who is Mr. So-and-So?"

Is it any wonder that the company must spend money to send a representative from headquarters to those towns when any trouble develops there with the city authorities or the subscribers?

Personally, I'd rather take my chance of "getting by" in a town where the telephone service was more or less "rotten," but where I, as manager, and the company stood well, and had the friendship of the citizens, than in a town where the service was bang-up, but the manager and the company unpopular.

But, of course, if I could produce good service, and, in addition, keep my company in friendly standing with the people—then I'd never worry about anybody taking my job away from me, unless it was because the company had a bigger place for me, and that would very likely happen, too!

Keep the "public relations" proposition in mind, Mr. Manager, please.

Not just for the company's sake, but for your own! For these things, I believe, will help you—will make you a bigger, broader man. Do them for that reason—not for the coldly selfish business reason of benefit to the telephone company.

But it will benefit the company just the same, for whatever helps you, Mr. Manager, also helps the telephone company.

Government Economizes On Service.

Uncle Sam complained to Charles Nagel, custodian of the Chicago federal building, that his telephone bills would be too high under the new measured service rates of the Chicago Telephone Company, if all departments were operated from one exchange as heretofore.

Accordingly four systems of telephones have been installed in the government building for the postoffice department, the department of justice, the treasury department and the internal revenue department. The general exchange is abolished.

The new telephone numbers in the order named will be Harrison 4700, 4701, 2702 and 4703.

The annual cost of telephone service to Uncle Sam has been $48,000. There have been twenty-two unlimited trunk lines entering the building and eighteen limited trunk lines leaving it.

Mr. Nagel said that on one trunk line recently under inspection for a single day there had been 175 calls made from the federal building. This volume of service would make Uncle Sam's telephone bill a staggering monument of cash under the new rates for measured service. In the past unlimited trunk lines have cost $1 a day.

To reduce the cost of service for the government by eliminating all but official calls, a new regulation is expected to be issued announcing to all federal employes that they will no longer have the privilege of unlimited service for their personal use.

It has been reported that one individual servant of Uncle Sam had to his credit thirty-three calls in a single day. Other employes of the federal service to a lesser degree enjoyed unlimited telephone privileges.

High Frequency Currents on Wires

Communicated to the "Journal of the Franklin Institute" by Major-General G. O. Squier

By LIEUT.-COL. J. O. MAUBORGNE

ATTENTION was first directed, in 1911, to the practical utility of employing high frequency electric waves for transmission of energy along wires by Major (now Major-General) George O. Squier. The discussion following the publication of his results indicated that, in the minds of many, the opinion prevailed that because of the excessive attenuation obtaining at the "ultra audio" frequencies, the system would be inoperative over great distances. This was thought to be particularly the case if frequencies greater than 100,000 cycles per second were employed.

Recently this subject has assumed an important aspect from a military standpoint and it was decided to conduct further experiments with the object of examining the possibility of adapting certain existing types of radiotelephone and telegraph apparatus to multiplex operation. The results of the few preliminary tests which have been made recently by First Lieut. R. D. Duncan, Jr., and Radio Engineer Samuel Isler of the Engineering and Research Division, Signal Corps, Washington, D. C., are of interest because they have shown that not only is it possible to transmit energy, at least in sufficient amounts to actuate standard "radio" receiving apparatus, over comparatively long lengths of wire circuits, but that frequencies considerably in excess of the value hitherto named as the upper limit could be employed.

The apparatus used in these tests is known as the SCR-67, which is the ground set of the standard ground-airplane radio-telephone equipment. It comprises two three-electrode vacuum tubes of the transmitting type (Type VT-2. One oscillator and one modulator) and connected circuit, a receiving tube (Type VT-1) and circuit, and a two-stage audio frequency amplifier. The method of modulation, that devised by Heising, is based on the fact that, to very close approximation, the amplitude of the high frequency current is directly proportional to that of the emf. applied between the plate and the common filament terminal of the oscillating tube; any variation of the emf., for example, at an audio frequency, will modulate or mould the continuous flow or high frequency energy in a corresponding manner, which when received by a tuned receiving circuit and rectified, manifests itself as an audible sound in a telephone receiver. The means by which the modulation is accomplished is by a second tube, whose plate filament path resistance is varied in accordance with the speech frequencies applied to its input terminals. By properly interconnecting the plate or output circuits of the oscillating and modulating tubes, and by further converting the high voltage plate power supply to the two tubes from a constant potential to a constant current system the variation in amplitude of the high frequency current may be made to follow out faithfully the variations impressed by the modulating source. This system is advantageous since the completeness and purity of modulation is practically independent of the frequency of the oscillating system.

The line may be connected to the source of oscillations in a number of ways, of which probably the most convenient is by inductive coupling.

To provide a practical means for carrying out the tests, a wire, running from Washington, D. C., to New York City, was placed at the disposal of the Signal Corps by the Postal Telegraph Company. This line was duplexed and was in continuous operation by the Postal Company. In the first series of tests one multiplex station was established at the Signal Corps Radio Laboratory, Bureau of Standards, Washington, D. C., and a second at Dixon's Park, Curtis' Bay, Md., approximately three miles from the Postal office in Baltimore, the total wire distance between the two approximately 60 miles. The multiplex apparatus was connected to the line at these two points.

Satisfactory two-way communication was obtained; speech was received at both stations, loud and with exceptional clearness, the distortion common and inherent to long distance wire telephony being completely absent. The tuning at the receiving stations was quite definite, comparable in every respect to that when receiving signals of a "sharply" tuned radio station. This last fact permits of the operation of a number of multiplex units, each tuned to a different frequency and without the use of filter circuits on the same wire line. The carrier frequency employed in these tests was 600,000 cycles per second (wave length 500 metres); the effective line current, measured at each of the transmitting stations, averaged 60 mil-amperes. Throughout the tests the operation of the multiplex apparatus in no way interfered with that of the wire telegraph apparatus nor was interference experienced from the latter.

The satisfactory range of an SCR-67, when operating as a ground "radio-telephone" set, in communication with a corresponding SCR-67, is, under ordinary conditions, 10 miles. Thus by confining and directing the flow of energy to a definite direction, the range is materially increased.

The advantages of multiplex telephony and telegraphy are many. From a military standpoint alone, it is obvious that in time of war, any means of increasing the traffic handling capacity of already overburdened telephone and telegraph lines will be of inestimable value. There is a further advantage from an economical standpoint, in that certain of the existing types of Signal Corps radio-telephone and telegraph apparatus, large quantities of which were purchased during the war and which are now idle, with only slight changes in construction, may be adapted to either radio or multiplex operation. The increased range obtained makes possible the connection of outlying military posts and establishments with low power units where ordinarily comparatively high power and consequently heavier apparatus would be required if strictly radio communication were solely relied upon.

Income of National Companies for June

Net operating income of telephone companies in June is estimated at $7,366,787, against $6,409,945 for June, 1918 in figures announced by the Interstate Commerce Commission. Gross operating revenue aggregated $34,177,457 in June and $28,257,295 in June, 1918. Expenses amounted to $24,464,180 in June and to $19,848,056 in June, 1918. Net operating revenues totaled $9,718,277 in June, against $8,409,237 in June, 1918.

Los Angeles Manual-Automatic Unification

Presented at a Section Meeting of the A. I. E. E. at San Francisco

BY D. E. WISEMAN.

Abstract of Paper

A description is given of the physical consolidation of the Bell manual and the Automatic Electric telephone systems of Los Angeles, Cal., which previously to June 1, 1918, operated as separate systems. While similar consolidations had been made previously they included relatively small volumes of traffic and afforded no engineering precedents as a guide to the consolidation of two systems serving 129,000 stations. The plans for the physical union of the two companies were devised by a joint committee of engineering representatives, and contained a number of novel operating and construction methods which are described.

Under the new system each subscriber has access to every other subscriber in the Los Angeles exchange and to all long-distance lines centering there. Where duplicate services were installed the subscriber was given his choice as to whether he would retain the manual or the automatic system, and about 12,500 duplicates were eliminated, the choice between the two types being equally divided.

IN telephone engineering and the resultant physical and economic accomplishment, June 1, 1918, figures prominently, for on that date the formal union of the Bell manual telephone system operated by the Pacific Telephone and Telegraph Company, and the automatic electric system operated by the Home Telephone and Telegraph Company in the city of Los Angeles, was effected under the management of the newly created Southern California Telephone Company, giving to every telephone user in that area a unified and unrestricted exchange telephone service and universal service over toll trunk lines to some eleven million telephones throughout the United States. Consolidations of this character have been made prior to this date but involving relatively small volumes of traffic and simple operating methods so that there were no records of actual performance or established engineering practices to serve as a precedent and guide for determining the effect of and the physical requirements necessitated by the sudden release of two large, distinct and separately bound volumes of traffic into a common channel.

Because of the novel operating and construction methods and the speculative possibilities involved in the important pioneering work of welding these fundamentally different telephone switching systems into a single eighteen million dollar plant serving 129,000 stations, a semi-technical summary of the events has been prepared for general information.

A brief reference to the conditions which brought about the consolidation will be made in order to better understand the problems that confronted the two competing telephone companies and their subscribers. Believing that competition instead of control was the automatic remedy to apply to public utilities, the city of Los Angeles invited telephone competition about sixteen years ago and then struggled along with her business firms and many of her residents paying two telephone bills for a divide and what proved to be an unsatisfactory telephone service. This condition was continued until the year 1916, when the public decided by popular vote to bring about an end to dual telephone service. Negotiations were begun and various proposals were considered by all concerned in an effort to avoid any waste or arbitrary measures. A plan was finally accepted for the organization of a local telephone company, which was to purchase the properties of the existing operating companies and unify the service, continuing with the equipments then in plant and giving the right to the telephone users to determine for themselves whether they would retain their automatic stations or manual stations. War conditions imposed restrictions in the conservation of materials and men for such projects and called for a careful weighing of the expected benefits and expenditures of materials and labor.

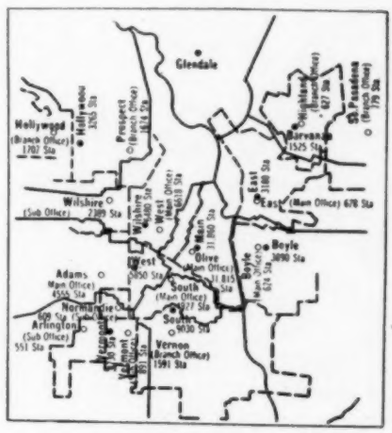

Glendale
Hollywood (Branch Office) 1707 Sta
Hollywood 1265 Sta
Prospect (Branch Office) 1414 Sta
Pasadena (Main Office) 1525 Sta
Wilshire (Sub Office) 2389 Sta
West (Main Office) 1850 Sta
Olive (Main Office) 31 815 Sta
East (Main Office) 678 Sta
East 3100 Sta
Boyle 3090 Sta
Adams (Main Office) 4556 Sta
South (Main Office) 2917 Sta
Arlington (Sub Office) 551 Sta
Vernon (Branch Office) 1591 Sta

Fig. 1—Area Served by Duplicate Plants.

With this clear understanding of the requirements, a joint committee of engineering representatives was appointed to determine the methods for the physical joining of the two systems. As a result of their efforts, a fundamental plan, together with preliminary estimates of cost, was submitted and formally approved by the city of Los Angeles, the Railroad Commission of the State of California and by the attorney general for the Federal Government, and on May 1, 1917, formal authorization was given to proceed with the project.

In order to picture the plants as they existed prior to the consolidation, I shall refer briefly to the physical properties and the operating methods of the two systems. Referring for a moment to Fig. 1, the area served by the duplicate plants was about 200 sq. mi. and lying within the corporate city limits. The open and solid circles show office and wire centers of the Home and Pacific Companies respectively, while the dotted and solid lines mark the areas of the respective districts. The Pacific Company was established first and the opening and location of its offices followed the telephone development of the city. The first office was located in the business area and as the population increased and spread to outlying districts, new offices and districts were established. Each office was located as near as practicable to the center of the wire distributing system as determined by a study of the existing plant and expected growths for 15 or more years hence. As years go by and old offices are outgrown studies very often show an economy in subdividing the original district or changing the boundaries so that this natural process tends to correct any errors in estimates of growths and locations of such expected growths.

May 1, 1917, the Pacific Com-

pany's exchange consisted of its standard outside plant and station equipment and nine manually-operated central offices serving about 69,000 stations. Bell equipment was used in units having a capacity of 9,600 multiple lines. Telephone connections were established generally by the calling subscriber removing the receiver from the switch hook, causing a light to appear before an answering *A* operator, who upon receiving a request for a particular number cut-in on an order wire to the particular switchboard unit in the district, indicated by the prenx of the number called-for. An operator at the distant switchboard unit, assigned a trunk over this order wire to the calling *A* operator and completed the connection by plugging into the called-for subscriber's multiple. Fig. 2 shows a schematic transmission circuit of a typical connection. The operation of this circuit will be described later and in connection with the unified plant.

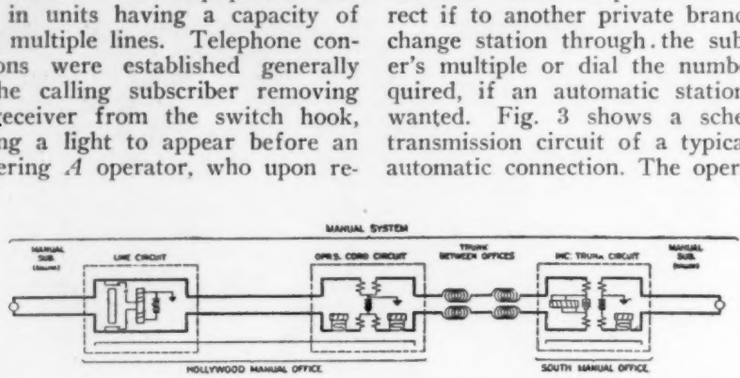


Fig. 2—Equipment Involved in a Connection Between a Hollywood Office Manual Subscriber and a South Office Manual Subscriber.

The former Home Company operated an automatic exchange including a parallel and similarly constructed outside plant and fourteen offices serving a total of approximately 60,000 stations. About 35,000 stations were equipped with dials and approximately 25,000 manual stations operated from private branch exchanges and as public pay stations. The lines from the manual stations terminated on a 45-position manual switchboard in the Olive office. Calls from automatic stations to automatic stations were made by dialing five or six digits, as required, to reach the particular district and individual subscriber. In capacity the former Home plant was one of the largest and probably most successfully operated of any automatic system installed in the United States or abroad. Home Company private branch exchange subscribers were reached by dialing the private branch exchange operator, who completed the connection. Calls outgoing from private branch exchange subscribers were trunked to the manual transfer board above mentioned, the calls coming in on an automatic traffic distributor which placed each line lamp signal before a non-busy operator. The operator upon taking up these connections would complete the call direct if to another private branch exchange station through the subscriber's multiple or dial the number required, if an automatic station was wanted. Fig. 3 shows a schematic transmission circuit of a typical full automatic connection. The operations and functions will also be described step by step later.

Los Angeles has had the distinction of having more telephones per capita than any other city in the world and is now very close to the top of the list. This general usage is reflected in the number of calls originating in each system, as shown by the records of traffic. The approximate numbers of daily average calls originating in the former Pacific plant and Home plant were in the vicinity of 430,000 and 420,000 respectively.

The engineering problems demanded, therefore, a reasonably close approximation of the volume of existing and added traffic which could be expected to flow between the groups of stations of the various districts of the two plants; a determination of the most direct and economical routing of such calls based on efficient operating methods and the use of existing facilities; and the design and development of an inter-unit trunking plant and switching circuits necessary to maintain the commercial standards for transmission and supervision between the two systems regardless of the mechanical, electrical and operating inequalities. Visual and audible signals peculiar to the separate systems required for supervisory purposes needed to be synchronized or harmonized and extended when necessary so as to afford common usage.

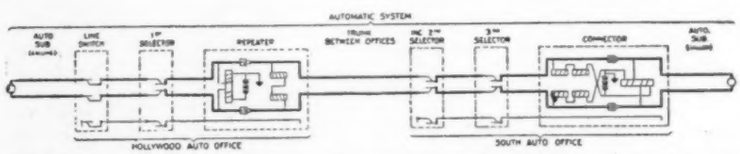


Fig. 3—Equipment Involved in a Connection Between a Hollywood Office Automatic Subscriber and a South Office Automatic Subscriber.

It is obvious that a great many plans and combinations of plans for unification were developed in sufficient detail to determine their relative capital and operating costs and advantages and disadvantages. The plan in principle that was adopted for handling the inter-office traffic between the systems was to operate all existing offices as units of the complete exchange and route the new automatic or manual trunks of each office into the adjacent office of the opposite system, where the connection could be completed by the most direct method and route.

Having referred to the facts that were most vital in shaping the project, I should like to outline the organization and schedule of work involved in the construction program estimated to cost $1,250,000. Every reasonable effort was demanded to bring about a unification of the properties without waste of time, and accordingly a complete schedule for the ordering of materials, manufacturing, assembly and installation thereof was set up after a canvas of probable material deliveries and of the labor situation. It became evident that a period of twelve months would be the shortest time possible to complete the necessary work, keeping in mind that war demands might upset the schedule, and all effort was centered on finishing the project within the minimum time. Specifications and plans were completed for each individual project, numbering all together about 110, and each one was charted with due regard to the materials involved, quantity, desired time of delivery and installation and its relation to the project as a whole. Fig. 4 shows a typical group of projects and illustrates the method of maintaining the schedule for the whole program. As items of material were, of course, duplicated in a great many of the specifications, a master chart was prepared showing the total quantities of each of the thousands of items required at specified dates.

The largest single project consisted in the design and manufacture of the 66-position special tandem switchboard and associated equipment to be located in Olive office for the translation and distribution of calls from automatic stations to manual stations in the downtown area. This switchboard, together with the switching circuits were designed in detail by the engineers in the general office of the telephone company, and all of the manufacturing and assembly work was performed in San Francisco. Extensive rearrangements of the Olive office building were necessary to provide space for this equipment and for retiring quarters for the large number of operators required to give the necessary 24-hour continuous service. Fig 5 shows the floor plan arrangement of this switchboard and associated operating room space.

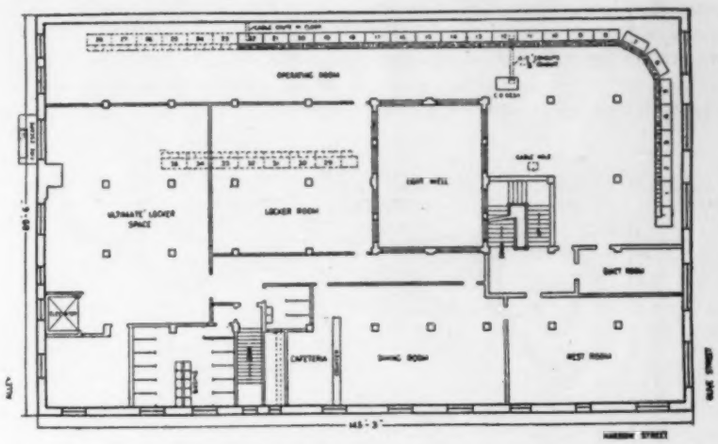


Fig. 5—Plan of Second Floor Olive Office, Los Angeles, Cal.

In the manual offices it was necessary to equip the regular subscriber positions with a dial for sending out the electrical impulses, and to provide outgoing trunks connecting directly with the automatic equipment in the adjacent office. There were approximately 375 subscriber switchboard positions in the manual system in the Los Angeles exchange that required the installation of this special equipment and associated wiring and this proved to be one of the most difficult parts of the work, because such work had to be performed on positions of switchboard that were in continuous operating service. I will refer to Fig. 6 and describe the switching circuit associated with the dials at the operators' positions. Each operator on the subscribers' switchboard is provided with 10 outgoing trunks terminating in the nearest automatic office on first selectors. These outgoing trunks are provided with twin jacks, one above the other, and electrically connected so that the dialing device can be associated with each of the trunk circuits to the distant office. The plug connecting with the dial is inserted in the lower first jack while a call originated by a manual subscriber for an automatic station is connected to the upper first trunk jack by means of the regular *A* operator's double-ended cord circuit. The operator then proceeds to dial the number requested and as soon as this number has been dialed, the operator moves the dial circuit plug to the lower second jack, thereby pre-selecting the trunk circuit for the next call for an automatic station. The operation of the second and third selectors and final connector is the same as described later under "Automatic to Automatic Connections." The circuit is so arranged that the manual *A* operator just referred to receives direct supervision for both the calling manual and the called for automatic station. At the end of the conversation, the lighting of a lamp associated with each end of the *A* cord circuit indicate to the operator that the connection has been finished and all cords are to be cleared from the subscriber's line and trunk jacks. The outgoing dial trunks are used in rotation and the actual number of the trunks connected by such lines to the distant office varies with the traffic requirements.

— SCHEDULED PERIOD FOR COMPLETE DELIVERY OF EQUIPMENT
— ACTUAL EXTENSION OF PERIOD OF DELIVERY OF EQUIPMENT
---- SCHEDULED INSTALLING PERIOD
ACTUAL INSTALLATION PERIOD
O SHIPPING DATE REQUESTED FOR FRAMES & RACKS, CABLE & JACKS
X ACTUAL SHIPPING DATE FOR FRAMES & RACKS, CABLE & JACKS

OFFICE	DESCRIPTION	MAY	JUNE	JULY	AUG.	SEPT.	OCT	NOV	DEC	JAN.	FEB.	MAR	APR	MAY	JUNE
EAST NO. 6	ADD 7 SUBSCRIBER SECTIONS & 170 DIALING TRKS. REARRANGE ANS JRS & ADD RINGING TONE														
BOYLE NO. 1	ADD MISC EQUIP & 180 DIALING TRKS REMOVE 660 ANS. JRS. REARRANGE ANS. JRS. & ADD RINGING TONE														
WILSHIRE NO. 3	REMOVE 380 ANS. JRS. REARRANGE ANS JRS. ADD 270 DIALING TRKS ADD RINGING TONE														
MAIN NO. 10	REMOVE 1180 ANS. JRS. REARRANGE ANS JRS. REMOVE 150 O. G. T. ADD 1500 DIALING TRKS & ADD RINGING TONE														
MAIN NO. 16	ADD 1 NO. 7 CENTRALIZED INFORMATION DESK SECTION 45 INCOMING TRUNK CIRCUITS														
TOLL NO. 8	ADD 60 O. G. T. & DIAL EQUIPMENT & 70 RECORD TRUNK ANS. JRS.														
SOUTH NO. 5	ADD 2 SUB SECTS & 450 DIALING TRKS. REMOVE 1600 MULT. & 200 ANS. JRS. ADD RINGING TONE														
WEST NO. 8	ADD 4 SUB. SECTS. EXTEND 1600 MULT. ADD 790 DIALING TRKS. 263 ANS. JRS. & 80 O. G. T. REARRANGE ANS. JRS. ADD RINGING TONE														
OLIVE NO. 1	NEW 22 TRKS. SECTS. SPECIAL SUBS. SWBD. 1000 O. G. T. & 1100 PR. MARY & MULTIPLE ANSWERING JACKS														
CARVANZA NO. 4	ADD 2 SUBS. SECTS. 290 ANS. JRS. 110 DIALING TRKS & RINGING TONE														
VERMONT NO. 4	ADD 1 SUB SECT. 900 SUB. MULT. 290 DIALING TRKS. & RINGING TONE REARRANGE ANS. JACKS														

Fig. 4—Diagram Showing Method of Maintaing Schedule for the Entire Reconstruction.

Central office telephone installation work has generally been organized for individual projects usually confined to a particular office building. The plan of scheduling the material and utilizing this material to its greatest advantage made it necessary to depart from the regular practices of the installing forces and to provide that all of the work should be treated as one project wherein the men trained for specific work were to be moved from one office to another as materials arrived and thereby facilitating the completion of the work regardless of irregularities in the arrival of materials for a particular office.

This arrangement was one of the important factors in effecting the final completion of the central office work April 30, 1918. The time intervening from the date until the beginning of the delivery of the directory and the formal announcement of consolidation on June 1, 1918, was required in placing thousands of test calls over all combinations of connections to make sure of positive operation. In a typical connection between an automatic and manual station there are 41 relays, and 79 from manual to automatic, having movable parts controlling from one to ten electrical contacts, each of which must function in the proper sequence from the start to the completion of each telephone call. I do not wish to convey an impression that telephone circuits are inherently subject to failure

because they are not. The characteristics and operating requirements for each relay, for instance, is known mathematically and what it can be depended upon to do for a specific period of time. At regular intervals each type of relay is given its proper current adjustment using measuring instruments designed for that purpose.

The installation of telephone cables and central office equipment of the manual or automatic type required the use of highly trained and skilled labor and the telephone company faced the difficulty of obtaining the large number of electricians and mechanics required to hold the schedule and training them for the special work. As it was, considerable overtime became necessary to maintain a working balance between the arrivals of material and the available labor.

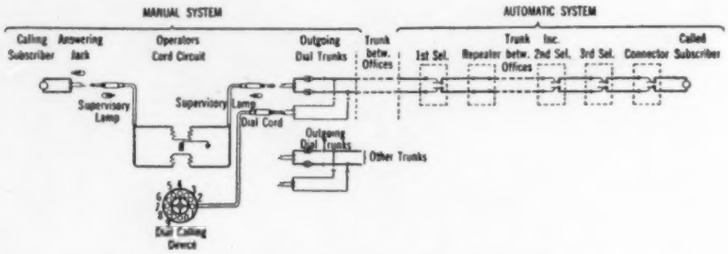


Fig. 6—Method of Establishing a Connection by Means of a Dial Calling Device.

Among the larger items of expenditure, and one involving months of study and calculations in voice transmission were the additions and changes necessary in the cable trunking plant in order to maintain commercial standards on all local and long distance connections. These studies included the use of and application of loading coils to the former Home Company cable plant amounting to about 1,000 coils and the addition and respacing of many of the coils in the portion of the Pacific Company cable plant. All together about 75,000,000 conductor-feet of various gages of underground telephone cables were ordered and installed to provide new routes and reinforce existing trunk groups required for the consolidated service.

Prior to the consolidation, practically all of the subscribers having private branch exchanges maintained duplicate switchboards and station apparatus. The problem, therefore, of consolidating this type of equipment offered no particular difficulty, as such consolidations could be and were effected by grouping the trunks formerly serving the separate systems on the particular switchboard to be retained, adding thereto the amount of line and trunk facilities desired by the subscriber and eliminating the duplicate switchboard and stations not required. The net effect was to remove about 345 single-position private exchange switchboards from the system. In the case of several of the larger commercial companies, it was necessary to order complete multiple private branch exchange switchboards of the 640-line capacity and about 30 sections of such boards were placed in service as fast as the equipment could be engineered and manufactured. It will be interesting to note that the flow of traffic to and from private exchanges was not greatly disturbed from the existing paths by this plan of consolidating; a principle which was kept well in mind and taken advantage of whatever practicable.

Where individual and party stations were duplicated, both stations were left connected until the new directories were delivered, at which time the subscriber was requested to use the telephone of the particular system that he had made application for and the other station was removed as soon as the construction forces could handle the work. Approximately 13,000 duplicate stations have been removed.

A considerable number of operators were required and for a while it looked very much as if the consolidation would have to be postponed because of the inability to obtain the needed force. Good service depends to a large extent on capable and efficient operators and you can appreciate the difficulty that confronted the operating department in the selection, employ and training of approximately 500 additional operators required for handling the special transfer switchboard installed in the Olive office building, and for the large number of added positions of switchboard in the various manual offices. A large operating school equipment was hurriedly manufactured and installed and training of operators was started about the first of the year 1918. The schedules also provided for the early installation of dials on the subscriber positions in the manual offices for advance training of the regular operating force. Special observation equipment was designed and furnished for practice work in placing test calls and later for supervision in determining and checking the accuracy of dialing the calls placed by the subscribers. By means of automatic recording devices the numbers called for by subscribers or instructors were compared with the numbers actually dialed and in this way the operating force was gradually brought to an efficient basis by the time the construction work was completed.

Proceeding under the restrictions that each subscriber having duplicate service should determine for himself whether to retain automatic or manual substation equipment, the commercial department carried on a vigorous campaign to obtain these subscribers' choices and to arrange accordingly. I do not have the exact figures but I understand that of the 18,680 duplicate stations about 5,200 duplicates were retained and the balance were divided evenly between the two types. The expected result of this canvass had been forecasted and was an essential factor in engineering and in construction work.

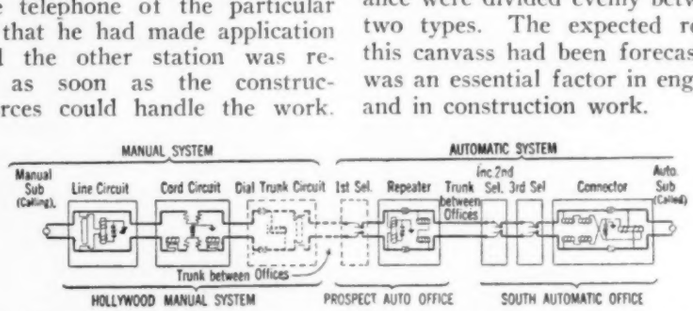


Fig. 7—Equipment Involved in a Connection Between a Hollywood Office Automatic Subscriber and a South Office Manual Subscriber.

As a function of the commercial canvass the directory department was confronted with the necessity of recasting the entire directory scheme to fit the particular needs of a unified service. A great amount of thought was given to the determination of the most efficient arrangement of listing and numbering subscribers, and while this seems trivial yet a careless directory arrangement reflects on the qual-

ity of the telephone service and robs the public of valuable time. Many number changes were involved and a complete relisting of every subscriber's name and number into one alphabetical list introduced great possibilities of errors. (It is a matter of passing interest that 165,000 copies of the directory were issued and distributed in Los Angeles and to other exchanges for long-and short-haul toll traffic and that over 441,000 pounds of paper were required in the printing of the consolidation issue.)

In the present unified plant, local calls are divided into four main groups and are obtained in the following ways:

Calls from Automatic Stations to Automatic Stations are obtained in the same manner as under the former Home management, that is, by the subscriber dialing the number wanted as indicated by the directory listing. Such subscriber sets are provided with the familiar dialing device arranged to transmit from one to ten electrical impulses for each "pull" of the dial. In the automatic system most of the stations are reached by dialing five digits although there are a few thousand six digit numbers. The operation of the first digit of the five digit numbers selects the office district required, the second digit selects the particular thousand, the third digit selects the particular hundred, while the fourth and fifth digits select the tens and unit respectively of the number desired. Referring to Fig. 3, the calling automatic subscriber upon removing the receiver from the switchhook completes an electrical circuit through a Keith line switch, the chief function of which is to direct the simultaneous calls to a minimum number of trunks to first selectors. Each automatic line therefore terminates on a primary line switch having ten paths to as many first selectors, these trunks being multiplied to other line switches, depending on the calling rate or traffic load of the particular group of lines.

The operation of the first digit of the number wanted causes the mechanism of the first selector to step the brush terminals upward to one of the ten levels arbitrarily connecting to a particular 10,000-line unit. This selector is of the trunk-hunting type, that is, the subscriber, as noted above, having dialed, say, the digit 6, causes six electrical impulses to be transmitted through the selector mechanism through the stepping relay, raising the brushes to the sixth level. The selector then automatically begins a rotary movement and continues until an idle trunk is found. There are ten trunks over which this rotary trunk selection takes place and the traffic is so distributed over selector equipment that with very few exceptions an idle trunk will be found within this group of ten. The connection is then established through what is termed repeater equipment (consisting of coils and relays by the aid of which the calling impulses are repeated from the local to the distant office and talking battery is provided to the calling station) to a particular second selector in the distant office.

The dialing of the second digit by the calling subscriber again operates the stepping mechanism to one of the ten levels corresponding to the thousands of the number wanted. Automatic rotary movement takes place, selecting an idle trunk to the third selector where the dialing and selecting of the hundreds is the same as for the first and second selectors. The connection now is established through to the connector which is similar in its operation to selectors with the exception that the tens digit steps the mechanism to the corresponding level while the units digit controls the rotary movement to the particular unit required. The connector also supplies talking battery to the called subscriber and sends out the necessary ringing impulses to call either the individual or party subscriber desired or sends back the busy signal if the line called is in use. The restoring of the receivers to their switchhooks automatically returns all of the connecting equipment to normal position again for use on subsequent connections.

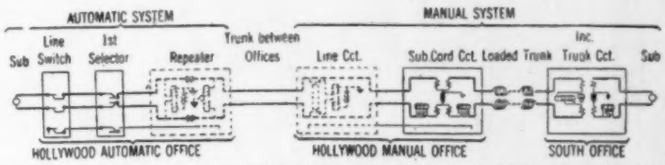


Fig. 9—Equipment Involved in a Connection Between a Hollywood Office Manual Subscriber and a South Office Automatic Subscriber

Calls from Automatic Stations to Manual Stations are obtained by operation of an arbitrarily assigned digit, the ninth digit or level being available in this case. Trunks from these first selector ninth levels lead the nearest manual office and terminate by the aid of the familiar line and cutoff relay on an answering jack with a lamp signal before an *A* operator. Referring to Figs. 7 and 8, the *A* operator upon receiving a line lamp signal, plugs into the corresponding answering jack and requests the subscriber to give the number (and office prefix) wanted as shown by the directory listings. The call is then completed within the office received or is trunked over the manual trunking system to the distant *B* operator in the same manner as described under calls manual to manual. In the downtown district where a considerable amount of traffic is involved, it was found impossible to add to the large number of *A* positions to the various manual units and it was necessary to install a special manual switchboard, shown in Fig. 5 in available space in the Olive office building. This special board contains only the necessary multipled terminating lines, outgoing trunks and key and supervisory equipment necessary for establishing the connections between the automatic and manual system. Automatic calls therefore in this district are completed by the dialing of the digit 9 as before, bringing the line signal in on this special *A* switchboard where such connections are completed as in regular manual practice over trunk lines assigned over order wires.

Calls from Manual Stations to Manual Stations are obtained in the

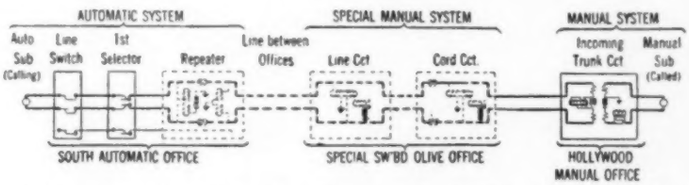


Fig. 8—Equipment Involved in a Connection Between a South Office Automatic Subscriber and a Hollywood Office Manual Subscriber.

same manner as existed prior to the consolidation, that is, by the agency of the *A* and *B* operators and corresponding manual switchboards. Referring to Fig. 2, the calling manual subscriber upon lifting the receiver from the hook causes a lamp to light before an *A* operator in his district. This line terminates on the ordinary line and cutoff relays, the former operating as soon as the switchhook closes the circuit, causing the line lamp to burn. The *A* operator then plugs into the corresponding line jack with one end of a double-ended cord circuit, this operation causing the cutoff relay to energize and thereby opening the circuit through the line relay and lamp. The operator then throws the listening key and requests the called for number. She then proceeds to complete the connection by plugging either directly into the subscriber multiple or by plugging into a trunk line leading to the distant office required and as assigned by the distant *B* operator over an order wire circuit. The distant trunk operator then plugs into the required subscribers' multiple and automatic ringing proceeds until the subscriber answers. Supervisory lamps associated with both the trunk cord and the double-ended *A* cord furnished the necessary indication to the operators of the establishment of the connection and end of the conversation. When both lamps associated with the double-ended *A* operator's cord relight, the connection is taken down and this operation gives a disconnect signal also to the distant trunk operator.

Calls from Manual Stations to Automatic Stations are obtained by direct trunk circuits. An *A* operator receiving a manual subscriber's request for a particular automatic number, as indicated by the directory listing, proceeds to dial the number in the same manner as described above for an automatic subscriber. Each *A* operator is provided with a group of trunks, as shown by Fig. 6 and described in the first part of this paper, leading to the nearest automatic office and terminating directly on first selectors.

Private Branch Exchange Calls originating from such exchanges of the former Home Company were formerly operated and are still operated on a manual basis. Calls placed by extension stations from these private exchanges are trunked to a manual switchboard in the Olive office building, this switchboard having the familiar subscriber multiple of all the private exchange trunk lines. The incoming private exchange trunk lines, however, are carried through Keith line switches, the function of which is to select a non-busy operator and to place the line lamp signal before that operator. This arrangement is commonly known as the traffic distributor. This pre-selected operator then receives the request for either an automatic or manual number and if for the former, she dials the number as described above for manual *A* operators. If the called for number is for another private exchange station, the operator completes the

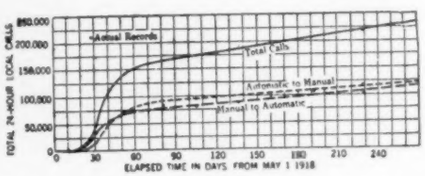


Fig. 10—Curves Showing Tendency of Originating Calls Between Former Pacific and Home Stations.

connection in the multiple similar to a manual-to-manual connection and if the request is for a station in a manual office, it may be obtained by the use of order wires and trunks direct to the office required or over trunk lines to the special Olive office manual *A* board. All connections to and from the former Pacific manual private branch exchange stations are completed in accordance with the above general methods of handling calls to and from manual stations.

Fig. 10 has been prepared to indicate the volumes of traffic expressed in calls that passed between the former automatic and manual stations as at the specified dates. The curve was developed from the following records and immediately after the record of September 13, 1918. (Later records have since been taken and are shown by dots on the original curve.)

	Automatic to Manual	Manual to Automatic	Total calls
May 31, 1918 (1 day before formal announcement)	16,308	31,870	48,178
June 21, 1918	71,883	70,921	142,804
July 19, 1918	83,589	76,556	160.145
August 23, 1918	95,059	80,285	175,344
September 13, 1918	105,602	88,161	193,763

So far as I know, no definite statement can be made as to the gains accuring to the subscribers at Los Angeles under the consolidated arrangement, because the most important factors are not capable of reduction to equated savings in dollars.

Some of the major factors resulting in direct benefit are:

1. Value to the subscribers resulting from telephone access to each and every subscriber in the Los Angeles exchange and to all long distance lines centering there.

2. Rental savings resulting from the elimination of a large number of duplicate stations and private exchange switchboards.

3. Elimination of the indirect economic loss due to confusion and community service inefficiency of separate telephone systems.

Some of the factors which tend to offset part of the savings are:

1. Added annual charges on the plat and equipment required to provide means for universal service. There was very little elimination of duplicate plant investment primarily because each plant was designed to care for a definite development and volume of traffic. Consolidation obviously does not reduce traffic volume, but because the telephone field is considerably increased to every subscriber, the total volume of traffic in the consolidated plant is substantially increased.

2. Added operating and maintenance costs.

From a careful weighing of these factors it is manifest that the consolidated plant offers substantial savings and benefits over the dual systems. The worth of a telephone system to any community lies, not only in its capacity for effecting good service but that such service shall be universal and available to the maximum possible number of local and distant subscribers.

Oregon Companies Merge

The entire telephone system of Polk county, Oregon, was placed under one head by a deal practically closed last month by which the exchange of Dallas, Falls City, Monmouth and Independence were consolidated under the new title of the Willamette Telephone Company.

The new corporation, with headquarters in Dallas, will be under the direction of H. M. Richardson, who has been manager of the Independence company. C. B. Sundberg, who has been manager of the Dallas Telephone Company for the past several years, will retire from the business and, with Mrs. Sundberg, will make an extended visit to eastern points this winter, after which he will return to Dallas and devote his time to his prune interests.

The Operating Situation in New York

A Statement Issued in Answer to Criticism of Service

BY FRANK H. BETHELL

ON the payrolls of the New York Telephone Company in Manhattan and The Bronx today* are approximately 8,100 employes. To effectively handle the traffic being offered at the present time, and making suitable allowance for the absence of employes now on vacation, we should have about 8,700 employes of average ability on the payrolls of the offices in Manhattan and The Bronx. The present force, however, is not of average ability, as it is very largely diluted with new employes.

All of the switchboard operatives have passed through the training school course and have had or are having the additional prescribed training which goes with their graduation to the central offices. The prescribed training courses, however, are and can be designed only to teach operators the correct methods to be followed in handling telephone traffic; efficiency in handling this traffic, that is, dexterity, both mental and physical, in putting up connections for subscribers, can only come through experience obtained in actually handling telephone traffic. The very large percentage of operatives who have been on the force a short time and who have neither the mental nor the physical exterity which comes with experience, doubtless produces in the minds of subscribers dealing with such operatives the impression that these operatives are not what has been termed "efficiently trained."

An operative who has passed through our operators' training department, which can normally be accomplished in three weeks, and who has been in a central office for approximately three or four weeks, has the necessary knowledge to enable her to handle with a reasonable degree of accuracy a relatively small number of telephone calls, provided the conditions are such that she can handle these calls methodically. It cannot be said, however, that such an operator is in a position to efficiently perform switchboard duties, for she has neither speed no dexterity, either mental or physical, to enable her to meet unusual situations or to handle any material volume of traffic. This can only come through experience. In a complicated telephone center such as Manhattan, an operator acquires some degree of skill in about six months, but under normal conditions it requires from nine months to one year before a new employe can be said to handle traffic with a reasonable degree of efficiency.

All of the operatives in our central offices pass through the school course and all of them receive the supplementary training which is given in the central offices. In the case of a few operators, and because of the large numbers that were receiving the training in the school, it was necessary to somewhat curtail the length of time spent in the operators' training department, but such items in the training courses as were omitted from the school course have been taken up by the operators in their supplementary training course in the central offices. The proportion of the number of new employes who have passed through the school with this reduced length of time in the school is very small.

Finding New Operators

The company is taking every step which its own experience or the experience of other telephone companies or other industries has indicated are productive in attracting to its service a sufficient number of employes. It is, of course, understood that experienced and trained telephone operators cannot be secured in the open market; that in this industry it is necessary to take raw material and train them after they have been engaged. The company pays a liberal wage to its new employes while this training is in process. Specifically, some of the steps which have been taken are as follows:

The company is widely advertising and has in the past two years widely advertised for new employes. It is only necessary to refer to the "help wanted" columns of the New York newspapers to verify this statement.

We have since January 1 inaugurated a system of recruiting through personal canvassing. Each central office has what is termed a "canvassing supervisor," whose sole duty it is, by personal canvassing and solicitation, to obtain young women who are willing to enter the employ of the company. These canvassing supervisors obtain the names of young women of suitable age in all parts of the city, visit the homes of these young women, explain to them the advantages of the telephone service and, when possible, engage them as employes of the telephone company.

We have from time to time increased the scale of wages in the effort to keep pace with the rising scale of wages in all lines of employment so as to hold our existing employes and to attract new employes to the service.

We have canvassed our existing force and have urged them to recommend to their friends and acquaintances that they enter the telephone business as a desirable occupation for young women. As a stimulant to this form of recruiting, each existing employe receives an additional day's pay for each new employe who may enter the service through her recommendation.

We are advertising our rates of pay and the general desirability of the telephone business in every way, both by newspaper advertising, by dodgers and posters which are displayed in various places in the effort to acquaint the public from which we draw our employes of the general desirability of entering the telephone service. As stated, we have adopted every reasonable measure that we ourselves can think of or that has been suggested to us.

The New York Telephone Company is now paying a basic wage to employes entering its service of $12 per week while in the school. This wage is raised to $12.50 per week at the end of the first month. At the end of the first year the basic wage is $14 per week and at the end of five years it is $18 per week. This is for day operators. Evening operators receive $1 per week more than day operators, and night operators receive $3 per week more than day operators of the corresponding length of service. Supervisors and those in higher positions receive increased pay. Chief operators receive as high as $42 per week. It should be understood that this is the basic wage but does not represent the earning capacity of an employe, as there are certain additional payments, namely, extra pay for Saturday afternoon work, extra pay for holiday work, extra pay for Sunday work, and what we term anniversary payments to those who have been two years or more in the service, which largely increases the earning capacity of an operator. An operator first entering the service is, under normal conditions, placed on evening work, which enables her the very first week she enters a central office to earn as a basic wage $13.50. Our figures show that during the first year the

*About August 1.

average new employe will earn something in excess of $900, and that during the succeeding years her actual earnings will, of course, considerably increase. We have also advertised these facts in our efforts to secure new employes.

We believe that the wages now paid are in general satisfactory to the employes, as there are few resignations received in connection with which the specific reason of insufficient wages is given. The most serious problem with which we have to contend in securing and retaining our employes is the fact that, with respect to hours of work, our conditions of employment compare unfavorably with those in practically every other line of industry. We have to give telephone service twenty-four hours a day, 365 days in the year, which means that some employes must be on duty during evening and night hours, on Saturday afternoons, Sundays and holidays, when employes in other lines of industry are at leisure. Employes take their turns in working these unsatisfactory hours, and in order to avoid this many employes leave our service to accept positions where their earning capacity is less than it is with the telephone company.

Numbers the Main Problem

The problem which confronts us is, first, to secure an adequate personnel so far as numbers is concerned, and, second, to train these employes. We have outlined above the steps that we are taking to increase the personnel of our force. On January 1 there were 6,400 employes on the payrolls in Manhattan and The Bronx. We have today approximately 8,100, a net increase of 1,700. We have, taking the operators' training course at the present moment, a total of about 775 new employes. We have during the past three weeks made net gains in the number of employes on the payroll of an average of 125 per week. If the present rate of recruiting continues, we should have, so far as numbers are concerned, the personnel required to handle our fall business within the next few weeks. As to the training of these employes, every employe placed in the central office has her period of instruction and will have her period of instruction in the operators' training department, after which, upon graduation to the central office, she is for the first few weeks put under the guidance of a special instructor who carries on the instruction work in connection with the operation of the particular office to which she is assigned. Every attention is being given to the development of the skill of these new employes. It will, however, be several months before we can expect our force as a whole to have the average experience which will enable them to handle the traffic with a great degree of efficiency.

We have made good progress in recruiting additional employes for the central office forces, but, as stated, the simple fact of recruiting these employes does not make them efficient telephone operators, and this efficiency can only be obtained as a result of experience in handling telephone traffic. In spite of the fact that the total number on the force is not now adequate to handle the traffic, there is a serious question as to whether anything would have been gained in the past six months even had we been able to still further augment our force. Had this been possible it would have meant a still higher percentage of inexperience, which would have reacted even more unfavorably on the service.

We had expected in May that we would experience the usual reduction in traffic which in past years has always been experienced during the summer months. It is an unfortunate fact that up to the end of June there was practically no decrease in the total volume of traffic that we were called upon to handle. In mid-July the gross number of calls actually handled was about the same as the average handled during the month of February. Normally we would have expected in the month of July to handle approximately 20 per cent less gross traffic than we handled in the previous February.

The situation was somewhat more aggravated by the fact that many of our experienced operators were away on vacation. These operators have been carrying the burden of a great overload during the past two years and vacations for them, which are always allowed by the company, are, of course, necessary in order that they may not entirely break down. If these vacations were not permitted, our resignations from our older employes would doubtless be very materially increased, if indeed we did not lose a very large percentage of them.

To offset to some extent these conditions, we have transferred to Manhattan some operators from other divisions of our territory and have stripped offices outside of Manhattan to an extent which seriously reacts on the service in those offices. We have done this appreciating fully the seriousness of the situation in Manhattan particularly. Certain plant additions have been completed and certain others are in process of installation which we believe will very shortly render the situation satisfactory from a plant standpoint. If our recruiting of new employes continues to be as successful as it is at the moment, we should, as I have stated, have an adequate number of people in the force within a few weeks. From that point on it is a question how these employes acquire sufficient experience to adequately handle traffic. Each day should see an improvement in the situation.

Michigan Independents Plan New Company

As a result of some of the rural pole-line telephone companies refusing to pay the advance in price for service asked by the Union Telephone Company in Gratiot county, Michigan, a number of rural lines have been recently shut off from service. In order to come to some mutual understanding and that the situation might be thoroughly understood by all concerned, Newton Burns, chosen to represent all of the rural companies, called a meeting of the subscribers in St. Louis. It was explained that the price has been increased from seven to nine dollars per year for service and from $2 to $40 per year for contract rights. The telephone company also demanded that dues be paid every month instead of every quarter.

The question was thoroughly discussed and before the end of the meeting it was decided to promote a plan for the incorporation of an Independent telephone company, composed of all the rural telephone companies of Gratiot county, after which it will be the intention of this company to give the Union company an opportunity to give service to the rural lines at a reasonable figure. And if the two companies cannot come to an agreement in price it is the intention of the rural company to install its own switchboard, operating as an Independent line. A meeting of representatives of all the rural lines in Gratiot county will be called at Ithaca in the near future in order to get the sentiment of the lines in all parts of the county. Mr. Burns expects to begin a canvass of the county immediately to obtain the valuation of all rural lines in order to decide at what figure the capital stock of the new company will have to be incorporated under the Michigan securities commission.

The Story of Phoneton

Ohio's Toll Line Village as Described in the Dayton "News"

BY ANNA MARIE TENNANT

NESTLED in the country roadsides a few miles northwest of Dayton and six miles east of Tippecanoe City, lies the little village of Phoneton, Ohio. As one passes through it, it is seemingly like hundreds of other small American villages, with its one general store and dozen or more comfortable homes. In reality, however, the life and heart of Phoneton is a three-story red brick building, which stands at the intersection of country roads, which are traveled more or less by automobiles going to and from Dayton and Springfield.

In this building every minute of the day and night, there ticks the ceaseless tapping of hundreds of telegraph instruments. Here on the second floor, north and south, and east and west meet over the wires, to exchange messages through the long distance telephone. Through the wires, both telephone and telegraph, there pass almost momentarily the heart throbs of a great nation, the joys and sorrows of a great people and the finance and business plans of a nation, the equal of which the world has never seen, America. The service on the third floor of the building where is stationed the telegraph apparatus, which sends news of current events and happenings to the furthermost parts of the United States, present a scene of perpetual motion. Never for one instant does the vigilant eye of the telegraph operator and overseer relax. The least disturbance on the wire is noted by him and instantly he is alert to locate any trouble.

Few persons know the existence of the village of Phoneton, which plays such a conspicuous part in the affairs of men, like many other such stations operated by the American Telephone and Telegraph Company. Few persons realize that many of their long distance calls go first to Phoneton, to be connected and forwarded to their destinations.

Four veterans of the Phoneton Office. Left to Right they are: George T. Parsons, Charles A. Bell, Austin C. Sinks and Charles L. Faries.

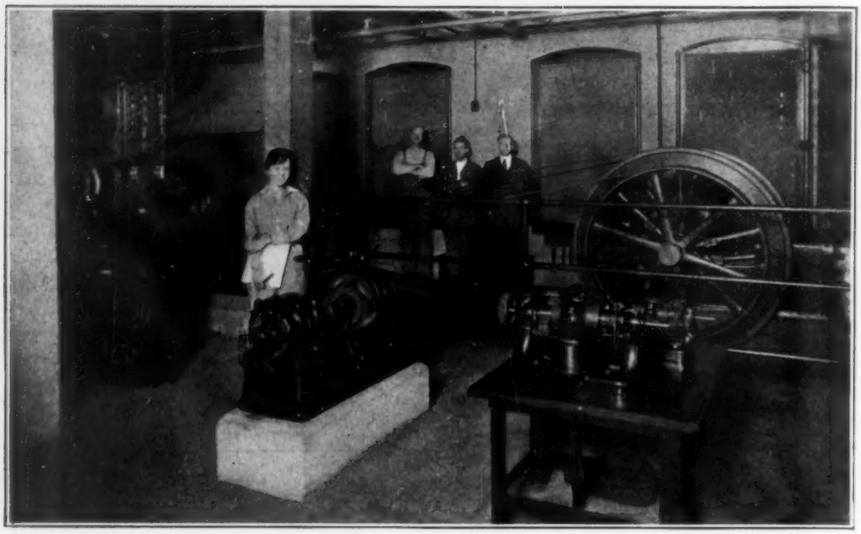
Miss Ruth Leopard, Phoneton's Equipment Girl.

Scene in Telephone Switchboard Room.

In appearance the home of the Phoneton office is like many other three-story red brick buildings. An American flag floats from the flagstaff on top of the building and waves a welcome to passerby. One has but to enter the building, however, to know that there is a busy center of life, that here is something unusual and that here is no ordinary country building. He first hears the steady click, click, at the many telepgraph instruments on the third floor and then he is impressed by the immaculate cleanliness of the stair case and floor. The stairs literally shine in their own brown paint, and there issues forth an air of refinement and never one of bustle or confusion. Although there is business system from the outset, yet that system is never noisy or turbulent, but always quiet, easy and smoothly conducted.

One Hundred and Twenty Circuits

This seems almost incredible when it is taken into consideration that the Phoneton office handles press reports



The Phoneton Power Plant.

for the Associated Press, United Press and International News Service. This means that practically all of the news of the world hums over the wires which pass through the Phoneton office. There are 172 wires going into the Phoneton station, providing about 120 telephone circuits. It is possible at the station to talk to any part of the country.

The Phoneton office takes care of trouble on 11,800 miles of wire, which is tested from the Phoneton station. In the plant department there are employed 22 persons and in the traffic department 21.

Direct telephone lines from the Phoneton station reach from Chicago to Point Pleasant, from St. Louis to Pittsburg and from Detroit to Cincinnati. On the second floor in a well-lighted, well-ventilated and scrupulously clean room, sit nine young women telephone operators at a long switchboard, over which hundreds of long distance calls come daily. These young women are supervised by two supervisors and one chief supervisor, who is now Miss Kathryn Snyder, of Tippecanoe City. Each young woman has her own special position and calls. She learns the intricasies of the switchboard at classes which are held in the room, while the actual work of the board is going on. A class of girls is always in readiness to fill any vacancies which may occur among the regular operators. Each employee is provided with a locker for her personal belongings. At the noon hour for a nominal sum a wholesome dinner is cooked and served to the operators. One hour is allowed for this meal and for their pleasure a cozy rest room, with a Victrola and current reading matter is provided. The young woman remind one of a happy family of sisters. When one of them was asked why she like Phoneton, she said: "Because it is quite here and one can enjoy her work and rest at the same time. Then we have nice surroundings and kind employers." L. B. Manchester is the manager of the Phoneton office. He is energy and dynamic force personified and conducts the station in a quiet and efficient manner. The company has provided a home for Mr. Manchester and his family next door to the Phoneton office. While many of the employes live in Phoneton, others prefer to live in Tippecanoe City, because of the ride back and forth to their work and also to get away from the cares of business when off duty.

One of the interesting features of the Phoneton wires is that three telephone and eight telegraph messages may be sent over a group of four wires at the same time. This is made possible by phantom circuits, and of these, there are 37 at the Phoneton station. This system has been in vogue at the Phoneton office for many years. Twenty-two persons may use four wires at the same time.

No Dust Permitted

The room where the delicate telegraph instruments are kept clicking constantly night and day is known as the test room. Everything is scrupulously clean and neat as dust could, if allowed to remain, ruin one of the instruments. As one comes into the room there is a large board with many incandescent bulbs upon it which when lighted summon the attendants to the various instruments.

System is the rule which prevails at the Phoneton plant and which has made it one of the important points of the American Telephone and Telegraph System. Trouble along the many miles of wire may be located within a few moments. There are arranged emergency circuits for the use of brokers, the press and government agencies. In case of heavy snows, and storms the use of these wires is oftimes necessary.

The village of Phoneton itself is located about half way between Dayton and Troy on the old Dayton-Troy pike and at the crossing of the old national trail. Phoneton came into being in 1894 and was given the name of Tadmor, which was then the name of the nearest railroad station and postoffice.

The village was established at the intersection of one of the American Telephone and Telegraph Company's east and west lines and one of its north and south lines. Toledo and points north being connected with Cincinnati and points south by the Maumee-Cincinnati line, while Pittsburgh and the east were connected with St. Louis and points west by the Pittsburgh-St. Louis line.

Had No Postoffice

All mail for the company was sent to Tadmor station and was handled by any one who cared to go for it, either on foot, horseback or drive the company's "Old Ben" horse and a light road wagon hitched to him.

In 1899 through the kindly efforts of N. H. Albaugh, who had served two terms in the house of representatives of Ohio, the village was rechristened Phoneton. This name was confirmed by the government at Washington and a postoffice established at the crossroads, with two small mail services each day. The name of Phoneton was originated by Mr. Albaugh, who first thought of "Phonetown," but he decided that the shortened name of Phoneton was more musical.

Farmers of the surrounding country of Phoneton in the early days of 1880 all belonged to a society known as "The Grange," and for the purpose of holding their meetings a two-story building was erected at the crossroads. Here meetings of the Grange were held twice each month. The lower floor was used for business meetings and the second floor for social gatherings. This building still stands in Phoneton. To take care of their rapidly growing business, the

American Telephone and Telegraph Company decided to place a lineman and a telephone operator at the junction, Phoneton. Space was rented in the old Grange building on the first floor and was fitted up with a small switchboard. Mr. and Mrs. James Loveall of Cambridge, Ohio, were sent to Phonton, Mr. Loveall as lineman and Mrs. Loveall as operator. Within the course of a few months, the company decided to make a twenty-four hour office and Miss Olie Wolf, a resident of the community, was put on duty at nights. She was the first night operator hired. In 1896 business had increased to such an extent, that the company found itself cramped for room. The southwest corner lot at the cross roads was purchased from S. B. Gassaman, who is now dead. Here a story and a half office and residence building was erected and fitted throughout with all conveniences. The front room downstairs was occupied by the traffic department of the company, while the front room upstairs was used as a test and repeater room. The manager of the plant lived in the other part of the residence. The business still continued to grow, in 1901 it was felt that further provision must be made and the company bought the lot south of the one it now owned. The building which was then occupied was moved to the south side of the new lot, that a three-story brick building might be erected. The building which the company now occupies was completed and ready for occupancy in November, 1902.

After the departure of Mr. Loveall, T. Moffatt, of Clyde, Ohio, was in charge until 1896, when M. B. Overly, of Altoona, Pa., was made manager. He resigned in 1902, taking a position with the Independent Long Distance Telephone Company at Cleveland, O. Associated with Mr. Overley were: W. R. Patton, now with Sunset Telephone Company, of San Francisco; M. H. Clapp in the equipment department. Mr. Clapp later entered the employ of the company at Chicago. He is now at Washington, D. C., having been appointed by William McAdoo as head of the railway telegraph and telephone companies.

W. W. Watt also connected with the Phoneton office was wire chief when P. J. Faulkner of New York, was with the organization, serving as manager for nearly three years. He then entered the service of the Harriman Railroad Company, being relieved at the Phoneton office by Mr. Watt. Mr. Watt remained until 1910 when he resigned, going to Cleveland as district superintendent of the Western Union Telegraph Company. He was later transferred to Chicago under the same title, with larger territory and is now located at Omaha, Nebraska, with the Western Union Company.

Phoneton is a law unto itself and is like a little world shut apart and yet vitally connected with teeming life. It was about 1896 that the population began increasing in earnest. At that time G. T. Parsons purchased the northwest corner of the cross roads and erected a small frame cottage of about ten rooms. This was to be his permanent home and he also planned to care for transients and for one or two employes who came to Phoneton in 1897. From 1898 up to 1900 Mr. Parsons did a flourshing business, having more boarders than he knew what to do with. Those who could not be accommodated at the boarding house secured service at nearby farm houses. In 1902, Mr. Parsons sold his place to the Deam brothers, two enterprising young men of the neighborhood, who immediately enlarged the building. When completed the building had 32 rooms, twenty-six of which were bed rooms. The years leading up to 1907 were busy ones for these young men. Their hotel was filled most of the time, and in connection with the hostelry they ran a livery barn, keeping six horses and vehicles which were in demand most of the time. In fact at that time if one wished to take a ride either for business or pleasure, it was necessary to speak for a vehicle some time in advance.

After a time these young men sold out their business which then changed hands one-half dozen times in as many years. Finally it became so that residents of the hotel did not know from one minute to the next, whether they would have a place to stay the next day or not. Many of them left, preferring to lodge and board in private homes, and the hotel soon went out of business. It is now used for a dwelling house for two families.

Phoneton had the record of one home a year being built there each year for eighteen years. The present population is approximately 480 persons. Situated in the village is one public school building, one church of Reformed denomination, one general merchandise store, postoffice, a garage, a blacksmith shop, a number of comfortable dwellings and the Phoneton offices. And if one looks long and hard enough he may even find the hitching pose and the proverbial yellow dog.

In November, 1910, Mr. Watt was relieved by J. J. Pillied, of Chicago, as district plant chief with headquarters at Indianapolis. Phoneton remained in district No. 43 until 1914, when it was attached to district No. 44, under control of H. D. Coe, then district plant chief, whose headquarters was at Cleveland. There are four of the early employes of the Phoneton office, still continuing their services with the company at the cross roads. Their stay averages

The Test Room in the Phoneton Exchange.

twenty years. These men who have served the company so faithfully are: G. T. Parsons, twenty-one years service; C. A. Bell, twenty-one years; C. L. Faires, nineteen years, and A. C. Sinks, nineteen years.

Truly have the prophecies of old been fulfilled, when the north and south and the east and west shall meet. Phoneton today represents the highest production in telegraphic and telephonic art and as one gazes at the myriad wires and intricate machinery, he wonders at the handiwork of man.

Miss Ruth Leopard is the only equipment girl at the Phoneton office. She knows thoroughly how to clean the delicate machinery and she is fond of her position. Miss Leopard wears the jumper costume and declares that at the plant. When war took away the young man, who was filling that position Miss Leopard gallantly and successfully filled the breach.

Interstate Commerce Commission Powers.

By F. B. MACKINNON,
President, U. S. Independent Telephone Association.

On September 2 and 3 the House Committee on Interstate Commerce gave an opportunity to representatives of the telephone companies to appear before the committee and express the attitude of the companies toward the so-called Esch Bill which is being considered by the committee in connection with railroad legislation. Under the terms of this bill the powers of the Interstate Commerce Commission are amplified and the solution of the serious railroad problems turned over to the commission. Telephone companies will be subject to all of the provisions of the act. Under this bill the entire regulation of the issue of securities of telephone companies will be in the hands of the Interstate Commerce Commission, as also would be the matter of consolidations, sales and purchases of telephone property; and all companies would be required to file rate schedules with the commission. By some it is thought that the bill will give the Interstate Commerce Commission practically exclusive control over telephone rates. While the proposed law may not take away any of the jurisdiction of the state commissions as to rates, yet it would create such a condition that there would be some confusion of authority.

In behalf of the United States Independent Telephone Association with F. C. Stevens, general counsel of the Association, I appeared before the committee. Speaking for the Independent companies we stated to the committee that those companies believe that under the conditions now existing throughout the country, any legislation changing the system of control or making new requirements upon the companies should be postponed until the period of adjustment is passed, and that when such legislation is considered it should be given consideration separately from the railroads; that while it is the belief of the managers of a number of our companies that some different form of control should be provided other than the present form of state and federal control combined, yet practically every one of those managers agree that now is not the time to make any change in the regulating bodies; that we have passed through a year of conflict between state and federal authorities and do not want to be forced into any similar experience in which we shall again be called to play the part of the innocent bystander.

We did not deem it wise to say to the committee, but I feel I should say to you, that one reason why we should not have conditions disturbed at this time and should not be included in any railroad legislation is that we must avoid, if possible, being drawn into the situation where due to a centralization of authority certain men might be likely to advocate the same sort of government ownership and operation for the telephone companies as is being advocated for the railroads. It is my opinion that we can well work under present conditions even if those conditions be unsatisfactory, rather than by new legislation to be drawn into such a dangerous and perilous position.

In presenting the matter to the committee I said in part:

"The telephone business is a distinct business from the railroad business, and the conditions governing and surrounding the telephone companies at this time are different from those governing and surrounding the railroad companies. The telephone companies do not find themselves in pressing need of legislation and do not find themselves in that condition where a major operation is needed. They find after this period of government control that they will be but slightly affected by the experience they have had, provided that during the coming months of readjustment the regulatory bodies which are now working upon their problems, solve those problems in accordance with the principles which the regulatory bodies have indicated they are going to apply. The telephone business in our opinion should be given that same earnest study, that same careful consideration that this committee has been giving for the past weeks to the railroad problem. Our problem we say is not pressing. We feel we should not become involved in this operation which is necessary to be performed on the railroad companies, and that we would be better off and the problem could be solved much better if the committee should postpone at this time any further legislation with reference to the telephone companies and at a later date take up under a separate bill the matter of regulation of the telephone industry."

I would suggest that all members write to their congressmen immediately, expressing their opinion of the desirability of further legislation at this time. The Esch Bill is officially known as House Bill 4378. I hope that in expressing the attitude of the Association we have voiced the sentiments of our member companies.

My attention has been called to a circular letter that was sent out in August by a Washington attorney calling the attention of telephone companies to the necessity of designating an agent in Washington to receive notices from the Interstate Commerce Commission. The Association acts as such agent for its members without charge. No other agent is needed. We therefore advise against paying attention to the circular but do advise all companies that have not done so to formally designate the Association of their agent.

Grand Rapids Merger Near

Formal contract under which the Citizens' Telephone Company will take over the property of the Michigan State Telephone Company in the Grand Rapids' district has been drafted by the former company for submission to the latter. It is expected the transaction will be closed at an early date.

"Electromagnetic Theory of the Receiver," by A. E. Kennelly and H. Nukivama, the first installment of which appeared in September, will be resumed in November.

Choosing Employees by Test

Presented Before the United States Independent Telephone Association

By O. A. KNELL

THE subject of handling employees, or employing labor, at the present time is taking more space in the press and more attention in the minds of all executives of industry than possibly has ever existed before. Labor conditions are such that volumes may be written, yet scarcely scratching the surface of the subject.

It is not my intention at this time to go into any of the causes for labor disturbances or labor conditions, other than to try to bring out the advisability of placing employees in such positions as they are best qualified to fill, consequently obtaining an employee who is contented and taking a real live interest in his work and company, instead of one who is a misfit and stays only for compensation or until other employment is available; or to employ such labor as is particularly qualified or peculiarly fitted to fill the position which you may have open at that time.

Many telephone employees are differently situated from those in a factory or shop, for there is no direct supervision over them at all times. For instance, too frequently a person is hired, who has no natural ability nor any special training, and given work which necessitates his dealing directly with the public. This may be in the capacity of a commercial representative, adjuster of a disputed or unpaid bill, or as an installer. He may have some sort of supervision, such as being an assistant or helper and be placed under the charge of some other employee for a short time and then allowed to depend upon his own resources to produce results. For instance, a collector may make a settlement that from the standpoint of his superior supervisor seems good, but by a lack of tact may plant a seed of dissatisfaction that will produce a field of trouble later.

By following him up, you may see that he is not competent, but how much better if you knew, in the first place, that he did not have the ability to handle the work properly.

Take another case; while installers they may learn to run the necessary house wire and install apparatus satisfactorily from the standpoint of standard specifications, the qualifications for meeting the public and leaving a subscriber satisfied that the company is doing all that it can to handle its patrons in the right manner, are not necessarily a part of the average workman's nature.

For instance, I have a case in mind where an installer was sent to place a telephone in a hallway in a newly built residence, where the stairway was all black walnut finish with small three-inch panels. The installer bored a hole at the base of the stairway, and, starting from there with his wire, ran diagonally a distance of about three feet, taking particular pains to follow the outline of the panels, making neat square turns and tacking the whole thing to the woodwork. The patron in this case immediately demanded that the wire be removed and the stairway fixed up, and it cost the telephone company approximately $130 to replace the paneling. This was a case where the employee was not qualified to handle his work from all angles. That is, he was a mechanic only and did not consider the job from the patron's point of view.

Many of you undoubtedly have found a condition where you have a number of employees in your organization who have fallen into a rut and practically progressed to their limit in the line which they are working, and when you want an executive for

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EMPLOYMENT BLANK.

We wish to know everything possible about you in order that we may do you no injustice. If some of these questions are too personal you are free to leave them blank, but we wish as many answered as possible, for each question gives us some insight into your character and will help in placing you right.

Name in full.....
Address .....
Telephone No. .....
How long have you lived there?.....
What position and wages do you want?.....
Date of your birth.....Where born.....Sex.....
Name of father and where born.....
What was father's business?.....
Where was mother born?.....
Are your mother and father living, and if not how old were they when they died? .....
Who brought you up?.....
Did you spend your childhood in the city or in the country?.....
How far did you go through school?.....
Give names of schools and colleges you graduated from.....
What educational courses are you now taking?.....
Are you naturalized?.....If foreign born, how long have you lived in the United States? .....
Are you married?.....Divorced?.....Separated?.....
Are you a widow?.....Widower?.....
How many children have you?.....
How many people, including children and relatives, depend upon you for support?.....
.....
Do you own your home?.....Live with your wife or husband?.....
With your parents?.....Live in a flat?.....Board?.....

Give particulars below of former employment, beginning with last job and going backward as fully as you can remember.

Name and address of firm who employed you.
What positions held.
Wages.
Date you began.
Date you left.
Why did you leave?

Name.....
Address.....
Name.....
Address.....
Name.....
Address.....
Name.....
Address.....
Have you mentioned all the firms for which you have worked?.....
Underscore the firm you liked the best. Why?.....
In which of these jobs are you at your best?.....
If employed now, state where and reason for change.....
.....
Give below a short history of your life.....
.....

some department you look over your list of employees, and after a study of them all, you will go out to your competitor, or some other organization, and hire a man to fill the place. Many times this is not the fault of the employees, but is the fault of the supervisor in not finding out whether the help under his direction is not better fitted for some other class of work. In the ordinary run of telephone work we attempt to employ outside men who have had experience, rather than teaching young men the work, and in this case the system of testing their ability is many times useless, but all progressive organizations I believe should, and a majority of them do, have their supervisors endeavor to obtain new blood to work into the important positions, and applicants of this kind can be, and should be so thoroughly investigated and their condition so completely understood, that the expense of training them for a term of months and then finding out that they are not the persons for the place or that they are not satisfied with the work and leave the company for something else, can be eliminated. This expense is given by authorities, such as Dr. Kathryn Blackman and Mr. Kemble, as ranging from $30 to $100. In the telephone fields, I believe that it is still greater than that amount and is certainly an economic waste, which, if it can be done away with, would become an important item in the expenditures of any large company.

There are different ways of ascertaining the qualifications of an employee. Dr. Kathryn Blackman, who has made a study and business of this nature and has established employment departments in a number of large institutions, uses the personal appearance method, or as it might be called, phrenology, to arrive at qualifications of applicants. Other authors on the subject use test methods in their applications.

The application is an instrument of information which is not used to its maximum capacity in the great majority of organizations. The applicant fills out an application and is asked to answer a few questions regarding his previous experiences, employment, health, eye sight and references as to his character. This is the substance of practically all application planks. Out of approximately one hundred firms called upon as whether the references were referred to, about one-third replied in the affirmative. The two-thirds pay no attention to this part of the application, but depend upon the employer's ability to pick out a good man by sight. This course is along the line of Dr. Blackman, but without the knowledge and teaching necessary to reach a decision, which the doctor is able to do.

EMPLOYMENT BLANK—FINANCIAL ITEMS.

..... Income..... Outgo.....
What monthly income have you from your property? .....
What monthly income have you from boarders or otherwise?.....
What monthly income do others of family bring in?.....
What is your total monthly income outside your wages?.....
How much does life insurance cost you, reckoned monthly?.....
How much do society fees cost you, reckoned monthly?.....
How much do installment fees cost you reckoned monthly?.....
How much does your rent cost you reckoned monthly?.....
How much does your board cost you reckoned monthly?.....
How much do building association fees cost you reckoned monthly?.....
How much does gas and light cost you reckoned monthly?.....
How much does coal cost you reckoned monthly?.....
How much does food and clothing cost you reckoned monthly?.....
How much do luxuries cost you reckoned monthly?.....
What is your total fixed outgo?.....

	Property Value.	Debts.
What is the value of your personal property and furniture?.....		
How much do you owe on them?		
How much do you owe on notes?		
How much do you owe on judgments?		
How much do you owe otherwise? Unsecured?.....		
Do you own lots?.....What is their value?.....		
Where are they?.....What mortagage on them.....		
If you own houses, what is their value?.....		
Where are they?.....What mortgages on them?.....		
What stocks do you own and value?.....		
How much endowment insurance do you carry?.....		
When is it due to you?.....		
How much other life insurance do your carry?.....		
How much have you borrowed on life insurance not listed before?....		
How many building association shares do you carry?.....		
How much have you paid thereon?.....		
In what banks do you deposit and how much?.....		
What do you own not listed above and what is value?.....		
What do you owe not listed above and what is value?.....		
What is the total value of all your own?.....		
What is the total amount of all the debts you owe?.....		
Is anything listed above in your wife's or husband's name, and how much?		
What is the total value of your wife's or husband's assets not listed above?		
If ever in business for yourself, what is the most you made yearly?....		
If ever in business for yourself, what is the most you lost?.....		
Have you ever bought oil or mining stocks?.....		
How much did you lose on them?.....		
Have you ever been in bankruptcy?.....		
What is the most you ever saved?.....		
Do you know of any reason why a bonding company might refuse to bond you?		
What is the principal thing you want to do in life?.....		
If you won $1,000 in a contest, how would you spend it?.....		

Some firms use no application whatever, but depend upon the personal interview of possibly two people in the organization to decide whether an applicant is to be given a position or not. Other organizations with a large number of employees allow the foreman, sub-foreman, superintendent, etc., to employ their own labor for their departments. More often in this case, the employee is hired through friendship of somebody working in the organization, with no other consideration of qualifications, thereby causing the company in many cases to pay for first class service, when it received only indifferent service for the salary paid.

In studying the work of William Fretz Kemble, the author of a very exhaustive work on this subject, we find he goes into detail regarding the employing of help by mental and physical test, using an application blank which is very complete. This blank at first sight would indicate a number of questions asked which look to be irrelevant and immaterial to the subject of employment; but given careful study, there is nothing in the application that does not tend to show the exact qualifications of the applicant to fill any particular position. He also deals with the character study, using a card index, which will show the relative ability of either ex-

ecutive or clerical force, or actual workmen. This includes the following subjects:

ACTION—Indicating degree of accuracy and skill, under which are six sub-divisions.

ARTISTIC—Under which there are eight sub-divisions.

ESTIMATING — Eight sub-divisions.

HANDWRITING—Nine subdivisions.

MUSIC—Ten sub-divisions.

Under the heading of CAPACITY there are the subheads of Memory, Life History, Education, Information, Languages.

Under USE—Executive, Mathematics, Concentration, System, Terminology.

Under FORCE—Reasoning, Imagination, Egotism, Ambition, Will.

Under CHARACTER—Economy, Religion, Reliability, Interest in Politics, Fellowship, Social Class, Conversation, Society, Man-Handling Habits.

Under PHYSICAL TRAITS—Different parts of the body are gone into, such as arms, fingers, sight, ears, hearing, nose, mouth, vitality, general health, looks, disposition, eyes, hair, family and nationality.

The employment blank reproduced here if answered entirely, will give all the information to fill out one of these charts:

This part of the application blanks simply give information generally called for on the average blanks of this nature, which tends to show the age, genealogy, education and what previous jobs the employee has had.

It is advisable also that all employees are free from financial straits, and very few companies wish to have employees garnished or to have litigation of any kind regarding their financial condition. There are companies who would be willing to take an employee, who has inadvertently become involved in debt in some way and is being pressed illegally, but whose other qualifications are such that he would become a good employee, and are willing to help him out of his financial difficulty. Consequently, the following is placed in the application blank. It is stated in this connection that employee is free to leave the questions unanswered, if they are too personal.

In order to discover religious inclinations and to find out whether the applicant is socially inclined and has a large acquaintanceship, he is required to give the names of any church, societies, clubs or unions to which he belongs, with any offices he holds, therein.

"In what religion were you brought up?" "Do you believe in it now?" These are very important, as it would tend to show the social life of the applicant. In some positions it is necessary that the employee have a number of friends and associates and that he should be, in effect, a leader among them. In others this is an objection, as it would tend to take him away from his work.

"What languages do you speak or read?" In many cases this would make no particular difference. In others it might be one of the vital needs of the organization.

Then follow the questions of physical health. "What kinds of sickness have you had in the last five years?" "Are you healthy now?" "Have you any headaches?" "Eye trouble?" "Rheumatism?" "Stomach trouble?" This would have a bearing on the attendance of an applicant, and upon his ability to do his utmost at all times.

Who is your political leader? This, in the case of a commercial man, might have quite a bearing upon what district he would be given to work in. Do you drink beer? Drink whisky? Smoke? Swear? Use slang? Ever gamble? Would you lie to protect a friend? Are you at total abstainer?

I believe that these questions are ones that you all can see the advisability of using.

From here on the application blank is one that at first sight would seem to indicate that it had no bearing upon the subject. The applicant is asked to underscore the things that he likes or can do, and put a double line under the things he especially likes. Put three lines under the things he can do especially well.

Under the heading of Games and Sports come checkers, chess, pinochle, poker, whist, solitaire, football, baseball, polo, golf, tennis, cricket, horse riding, horse driving, horse racing, motor boating, automobiling, bowling, pool, billiards, shooting, shuffle-board, dancing, singing, swimming, skating, bicycling. You will note that these inquiries as to both inside and outside sports tend to substantiate any answers that the applicant has made regarding his social position. For instance if a man plays baseball, football or polo especially well, it indicates that he has had considerable training along this line and must have a large acquaintanceship with others in the same line. Other answers, such as checkers, chess, solitaire, shooting, riding, driving, etc., may indicate rather a reticent disposition and a man of few acquaintances or friends.

Next comes the subject of Studies, which is subdivided into botany, mathematics, history, authorship, chemistry, physics, philosophy, psychology. It is readily understood why these subjects are asked, as an applicant having a learning toward any particular one of them might be placed in a position where it would be quite an advantage.

Next under the heading of Favorite Authors—The Duchess, Libby, McCutcheon, Doyle, Chambers, Scott, Dickens, Phillips, Browning, Shaw, Longfellow I believe that nothing indicates more plainly the turn of a person's mind than the books which they read. A person may from outward appearance be classed as one who has considerable ability and would make seemingly a first-class executive but if his taste in reading turns to the poorer class of fiction, it wll surely have a tendency to show in his every day life.

Next comes the question of Musical Ability. Under the heading of Instruments he plays, come—piano, violin, banjo, cornet, flute, trombone, fife, drum, mouth organ. This is also an indication of social position, together with the temperament of the applicant, as is conceded that any one who is a first class musician has the entrance card to society, which otherwise he might be unable to obtain.

Under the subject of Arts practiced are—drawing, drafting, painting, modeling, designing, millinery design.

Under Mechanical Ability he can use—wood tools, plumbing tools, machinist tools, fix an auto, run an engine.

Under Domestic Arts—can cook, nurse, build a fire, hitch a horse, sew, crochet, knit.

Under Machine Operating—can operate a typewriter, giving the make; tabulating machine, giving the make; adding machine, giving the make; sewing machine, elevator, silk loom, carpet loom, lathe, telephone board. What other kinds of machines?

Under Miscellaneous—can make a speech, row a boat, sail a boat, keep books, boss a gang of men or women.

Of these latter subjects, the one referring to mechanical ability and machine operation are the ones to be most carefully scanned for the telephone industry. It would be false economy to try to make a clerk out of a person who can handle wood

working tools, for instance, and who especially likes that particular class of work. The applicant should be told at once that he should seek employment along this line.

Under the heading of Things You Like comes cats, dogs, horses, nature, travel, gardening, social life, lots of friends, church, cards, sports, to stay home, business life, to make money, art, science, reading, automobiling, fine eating. Some of these questions you see are simply put in to check up others which have gone before, and are to indicate the nature of the applicant.

In the following the applicant is asked to cross out the things he does not believe in, and underscore the things he does believe in and put two lines under things he believes in very strongly; to put a question mark after the words or phrases that he does not understand.

I believe in—the Democratic party, Republican party, Independent party, Progressive, Labor party, prohibition, socialism, anarchy, the initiative, referendum, recall of judges, high tariff, low tariff, free trade, woman suffrage, popular election of senators, peace at any cost, strong restriction of immigration, government ownership, compulsory education, old age pensions, alimony—even without children, easy divorce, vice crusades, Sunday blue laws, the death sentence, more laws, less laws, eugenics, reincarnation, Christian Science, Christianity, hell, heaven, the devil, Jonah and the whale, in charms, palmistry, vivisection, in unions, trust and in government regulation of private wages, newspapers, plays, marriages and amusements.

I believe that—unquestioning obedience is the greatest business essential, perseverance always brings success, every one has equal opportunities for success, women are very much kinder and better than men, women will make better laws than men, the United States gives more liberty than any other country, the majority is always right, and that I, personally, am always right in my decisions and am above the average in ability.

This application blank is taken from the work of William F. Kemble, and while it is made up to cover most points which would be of value on sorting applicants before they are taken into the organization, the detail of the questions could be changed to suit the needs of the individual employes in the company and the answers used as a basis for rating new applicants. Mr. Kemble goes into the test in such a way as will show personal opinion. These are simply questions having to do in the main with current events, which require decision and obtain his rating as outlined above.

A number of tests should be given to show the condition of the memory, as this is of the greatest importance in making a success in any line. This may be done in various ways, such as showing a number of photographs, of faces for a few seconds, with the names attached, then after a specified time again showing them without the names and having the applicant name them. In order to obtain an idea of mental speed or quick sense of perception, the Chronoscope has been devised by Hipp and improved upon by Thomas Edison, which shows to the fraction of a second how quickly the mind will act in response to an order. This is of special value to motormen, chauffeurs and engineers.

Tests of this kind were made in the officers' training camps, and I believe that considerable progress along this line has been made by a number of the larger firms employing help.

In the later officers' training camps for commissions, I believe it will be found that those passing the examination and getting commissions are mentally above the average person, and will make better employees in executive positions than the average.

Mr. Kemble states that in his research he has found that 75 per cent of all persons are not fitted for the first work which they start at, and that about 40 per cent of all laborers are misfits. He further states that all incompetents have one or two traits that they can develop and thereby be above the average in that line.

You will understand that these tests are based upon the law of averages and in some cases may prove a partial failure; but I am confident if kept up they will prove a source of revenue to any organization well worth the effort.

It is impossible to give more than a mere outline of this subject in this paper, but there are a large number of works upon the subject, and I believe, in fairness to the employees, more thought should be given to it by those hiring help.

Kansas City Business Men Want Automatic

If Kansas City, Mo., does not possess an automatic telephone system within a few years, the views of the citizens and the city officials will oppose those of a Chamber of Commerce committee which made an investigation of the automatic in several cities recently.

Twenty reasons are cited for the committee's indorsement of the more modern phone, against which not one complaint was heard in any of the cities visited.

In Minneapolis and St. Paul it was found that the automatic is far superior to the manual and that the two systems are being unified for the purpose of installing complete automatic equipment.

Following are the automatic's advantages, as explained by the committee:

1. Doing away with the difficulty of obtaining operators and expense of training.
2. Immediate connections. No waits for "central." Speed in getting numbers; half time of manual on the average.
3. Identical service over 24 hours—full complement during night as well as during the day.
4. Extra mechanical equipment for safe margin over peak loads—ready at all hours.
5. No interruption to service because of interruption to street car transportation or because of epidemics.
6. Mechanical is better than oral for indistinct and broken English talkers.
7. Confidential service. No one can cut in or listen.
8. Never get wrong number if dial correctly.
9. Either get busy signal or ring when calling number.
10. Automatic ringing bell commands more prompt reply.
11. Rapidity of disconnection; makes lines immediately available for out or in calls.
12. No premature disconnections.
13. Improvement of long distance service; outlying points dial right into Kansas City.
14. No difficulty in interchange between automatic and manual during introduction of automatic.
15. Can catch by device persons calling wrong numbers or malicious calls.
16. Persons can test their own lines.
17. No increase of rates because of change to automatic.
18. Laboratory work on manual discontinued.
19. Troubles detected mechanically without complaints from subscribers.
20. Trend of times towards substitution of mechanical devices for human labor and the general adoption of automatic equipment throughout the country.

The Hot-Wire Telephone

Its Use in a New Form for Range Finding in the War

A DEVELOPMENT of the hot-wire telephone described in TELEPHONE ENGINEER for February, 1915, enabling it to be used successfully by the British army for range finding, was revealed at a recent sitting of the Royal Commission on Awards to Inventors in London. The inventor of the improvement is Major Tucker of the British army. An award of $20,000 was made in March on the understanding that the patent would be handed back to the inventor, who desired to have it for his own use. The officer's counsel declared that experiments were constantly proceeding, and that the invention was one of world-wide importance. There was no longer any reason for keeping it secret, it was said, since it had been used by many persons and had been captured by the enemy.

A representative of the treasury stated that it was impossible to say how extensive the use of the device had been by government departments. It was used for sound ranging during the war, and possibly would be used by the Post Office now. The agreement finally was made to award the inventor the $20,000 and to give him also all commercial rights except those of the Post Office.

Major Tucker's invention is reported to consist of a group of fine wires arranged in the neck of a bottle, and heated by an electric current. Distant discharge of guns produces fluctuations in the air which momentarily cool the wires, and their contraction generates sound waves of characteristic pitch and volume. The range is found by triangulation, using two of the "microphones." Dr. W. H. Eccles, original discoverer of the hot-wire receiver, is reported to have said he could see no use for the Tucker device in telephone practice.

Thermophones, or hot-wire receivers, as the name implies, are actuated by heat instead of electromagnetism, and hence their characteristics are different from those of the usual electromagnetic receivers. For example, the diameter of the wire that is used is all important. It is therefore well to consider first, in an elementary way, the relationship between the watts in a wire and the diameter of the wire, for sensitiveness must depend upon the readiness with which the wire can vary its temperature with variation of current. If we assume, for the moment, that the current density is maintained constant as the diameter of the wire is varied, then it follows that the current varies as the square of the diameter. If C stands for current, R for resistance and d for diameter, then $C \chi d^2$. Thus,

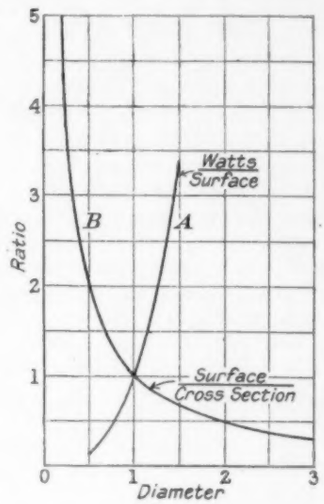

Diagram Showing Performance of Hot-Wire Receiver.

the watts (C^2R) for a given length may be expressed in the form,

$$\text{Watts } \chi \ d^4.$$

On the other hand, the surface of the same length is given by

$$\text{Surface } \chi \ d.$$

Hence,

$$\frac{\text{Watts}}{\text{Surface}} \ \chi \ d^3.$$

Taking the case when the diameter of the wire is greater than unity, it follows that the watts emitted per unit area rises very rapidly. For example, if the diameter is increased in the proportion of 2 to 3, the watts to be dissipated per unit area rise in the proportion of 8 to 27. Consequently, a limit may soon be reached when the permissible temperature-rise necessitates a lowering of the current density. For given temperature conditions, increased watts necessitate increased diameter of wire.

On the other hand, if we go to small wires the position becomes somewhat different. Suppose, for example, that the millimetre is taken as the unit of length and the diameter is reduced from 0.1 mm. to 0.01 mm. Then, for constant current density, the watts per unit area fall in the proportion $(1/10)^3$ to $(1/100)^3$; that is, to 1/1,000th of this previous value. Consequently, in order to maintain the temperature conditions, the watts may be increased enormously in the case of very small wires. It may, indeed, be found that the smaller of two wires may be able to carry more watts than the larger wire for the same temperature conditions. As an example, it has been found that a wire 0.001 mm. will carry 1.5 more micro watts than a wire of 0.003 mm. This is illustrated by curve A in the accompanying diagram.

The position may also be illustrated by considering the relation of surface to cross-section. We have

$$\text{Surface } x \ r.$$
$$\text{Cross-section } x \ r^2.$$

Hence

$$\frac{\text{Surface}}{\text{Cross-section}} \ x \ \frac{1.}{r}$$

From this it is seen at once that the ratio of surface to cross-section becomes smaller and smaller as r increases, provided r is above unity. On the other hand, if r is below unity the ratio of surface to cross-section increases rapidly. This is shown by curve B.

It will be easily understood that with very thin wires the great area of radiating surface as compared with the small cross-section allows the heat generated by the current to dissipate very rapidly. This property is made use of in the construction of thermophone receivers. A number of fine wires, 0.001 mm. or 0.0015 mm., are mounted in a semi-enclosed metal receptacle, and this in turn is enclosed in a similar case, but made of Erinoid or other insulating and hygienic material.

When the receiver is connected in series with a suitable transmitter and battery, and the transmitter is operated, the variations in the resistance of the transmitter cause the current flowing to vary. These variations affect the very thin wires, and as they dissipate their heat practically instantaneously, speech is reproduced by the motion of the small column of air caused by the heat variations.

The speech transmission is very faithful, articulation being perfect. There is no distortion, as there is no diaphragm; and while the column of air has a natural period of its own, it is in the region of 8,000 to 10,000, so that it is beyond the range of speech vibrations.

Having briefly described the operation, it may now be well to make a few comparisons.

It must be noted that the electromagnetic receiver is a very sensitive instrument, and responds to very minute currents circulating in the coils and to inductive effects which may be superimposed on the current flowing in the circuit, besides being subject to vibrations which affect its diaphragm mechanically. These qualities make it practically a series of instruments in one, of which one portion is wanted to reproduce speech, but as they cannot be split up, it proves very inefficient at times. It is a heavy instrument even in its lightest form.

The hot wire receiver is a telephone receiver pure and simple, and will only respond to the transmitter to which it is connected. When speaking it is necessary to speak close to, and into the transmitter mouthpiece for the best transmission. Inductive effects are absent; and there being no diaphragm there is no inherent distortion. It has the great advantage of responding perfectly to low-spoken tones, or whispers; and if the voice is raised there is no clash or confusion of sounds. It is featherweight, weighing complete from 0.25 oz. to 0.5 oz., according to the model.

The type of transmitter most suitable for use with hot wire receivers does not prove very satisfactory for electromagnetic receivers, and as the instruments in the former case are connected in series without any induction coil this is easy to understand.

The hot wire receiver, as made for speech reproduction, is not the best form for wireless use, and special receivers are made up for that work, but there are none in use at present. Some experiments have been made with the ordinary form for wireless purposes in England, but they have not been very satisfactory for the above reason.

Heat operated receivers have been referred to as "delicate" and "fragile," and further as "a scientific toy." These conceptions are quite erroneous. The receivers, as now made, will stand a considerable overload, and they are, mechanically, more robust than any other type of receiver on the market. They are machine made. They are manufactured in many forms, and vary in resistance from 20 to 3,000 ohms.

At present the hot-wire receiver is not so far developed that it can be said to be ready to replace the electromagnetic receiver for all branches of telephony, but it is declared that it has already filled conditions which the electromagnetic failed to do, and is available to replace its older rival in many important fields.

Half a Million For San Antonio

An improvement program involving the expenditure of $475,000 in San Antonio, Texas, during 1920 and 1921 was outlined by F. E. Farnsworth, vice president of the Southwestern Telephone and Telegraph Company, in an address before the Kiwanis Club at the Gunter Hotel. Among the contemplated improvements are a new telephone exchange for residents of the North Side, to cost about $275,000.

Mr. Farnsworth stated that this exchange probably will not be built until 1921. Other improvements, which will provide additional facilities for subscribers in the Mission exchange, Denver Heights, Beacon Hill and elsewhere, call for an expenditure of $200,000 before the end of 1920.

The new exchange will serve residents of the north section of the city and will cost probably $100,000 with added equipment that may equal that amount.

"By the first of the year, work now in progress will be completed by which additional facilities will be provided for subscribers of the Beacon Hill and Laurel Heights area. During the spring of 1920 completions will be made for additional subscribers in the Mission exchange district which covers Denver Heights and vicinity.

"These expenditures will total more than $275,000 and will include the installation of additional office equipment in the Crocket-Travis exchange which will be completed by the end of next spring.

"During 1920, outside construction work is planned by which additional subscribers will be cared for in Alamo Heights, Government Hill, the territory along River Avenue, East End and various points in the southwestern part of the city.

"The expenditures for improvements during 1920 will be $200,000. This will include additional central office equipment at the Mission exchange and the construction of a building which we will call the 'northern office building,' to be located to serve Laurel Heights, Beacon Hill and adjacent territory.

"This means that the company is planning to spend $475,000 during the remainder of this year and in 1920. In installing new telephones and miscellaneous improvements approximately an additional $100,000 will be used.

"In 1921 the central office apparatus will be placed in the northern office district, entailing an expenditure of $100,000."

Telephone Employes Raise Garden Truck

Up in the Chicago Telephone Company's main building last month the operators, testers and linemen, and the office employes to the number of 1,000 staged a garden contest.

W. B. Kirby, of Glen Ellyn, showed the girls a glass behive containing his champion swarm. They produced sixty-one pounds of honey in a season. He saved many dollars' worth of sugar with the bees, Kirby said.

Charles P. Chilvers, a telephone tester, won twelve prizes and a general prize of $5 with his exhibit.

"I saved $100 a year with my garden of 25 by 100 feet," he said. "I raise thirty dozen golden bantam corn, ten bushels of tomatoes and fifty head of cabbage. And I've got ducks, too. All city dwellers ought to have gardens."

The telephone girls under medical treatment at Margaret Mackin hall, Warrenville, won a general prize, too. Other prize winners were H. C. Piel, L. L. Browne, C. O. Dunn and G. Goth.

There was a crowd around C. Albert Perz's table. He lives in Beverly Hills. "Dandelion wine," whispered the labels on some bottles. He also had a basket of hops. And "high voltage" currant jelly. Miss Edith Percival raised some enormous tomatoes.

Marie Kilroy, Stella Rogers and Gertrude Shaffner, all telephone employes, thought the big watermelons and the pumpkins "just perfectly lovely."

Walter Dokin, E. S. Holmes and W. A. Meisner were the judges. E. H. Bangs is president of the Bell Telephone Garden Association. He said the telephone workers saved hundreds of dollars this summer with their gardens.

European Telephone Practice

Translations from the Foreign Press and Communications from European Engineers

By FRED W. SCHOLZ

Influence of Railroad Electrification on Telephone Lines

IT may be recalled that last year a group of eminent French electrical engineers visited the United States to observe various branches of the electrical industry and that among other things they gave careful study to the telephone equipment and to the great network of electric railways and the various problems that have arisen through the electrification of the various roads. Before the war comparatively few railroads of France had been electrified, although plans had been afoot to electrify several of the most important lines to a certain distance. Now that peace has been restored the French railways are going to work intensively on this task and the resulting effect that electrification will have on the telegraph and telephone lines that run along the right of way of these railways has been studied with great interest.

The present article touches upon various phases of the results of electrification of railroads in France on telephone lines and telephone service particularly and may offer some new thoughts that have been brought out by the French electrical engineers.

In starting upon this discussion we must prefix a few words of explanation. We will assume naturally that both telegraph and telephone lines are two-wire. We will have to consider the globular action of the contact wire (trolley) and of the return conductor of the traction equipment (rails and ground) in the case of monophase traction or of traction using direct current. Likewise in the case of triphase traction we will have to consider the globular action of two wires of contact and of the return conductors. In every case we must consider a circuit of two wires used for transmission of energy made up of two conductors twisted together insulated by paper and placed in a lead-sheath cable. On the outside of this cable we will have an electromagetic field due to the traction line which will be divided into an electric field and a magnetic field both of them variable with changing times, both of them perpendicular to the axis of the cable and consequently to the telegraph or telephone wires under consideration

Under these conditions we will evaluate the electric field and the magnetic field of the envelope or cable sheath, that is to say those fields which really influence the circuit used for transmitting sound. Then we will have to recount all the various ways and means by which these influences make themselves felt as disturbing factors in telephone and telegraph service. Finally we will indicate how these troubles can be remedied in practice citing such cases where traction lines and telephone lines have run parallel and where the telephone lines continue interurban and long distance wires of longer and shorter distance where they were connected to auxiliary lines and to lines connecting with subscribers as well as with telephone exchanges.

1. *Electric Field in the Interior of a Telephone Cable as Affected by an Electric Traction Line*:—Let us suppose in the first place that we introduce into a stable, uniform, electric field of an intensity having the constant h a telephone cable, having the usual lead sheath. Metallic bodies, particularly lead, are characterized by the presence of a considerabe number of electric bodies, which we commonly call electrons. They are very numerous, about 10^{23} per cubic centimeter. These electrons are able to group themselves freely in the space left between the atoms of metal. Consequently, as long as an electric force acts upon these electrons, there will be no equilibrium established.

When the cable which we are considering in our discussion is introduced into the electric field h, the electrons contained in the lead envelope or sheath are subjected to an electric force due to the field h. Electrons, being negative charges of electricity, influence the lines of force of the field in such a way that the electrons coming from the direction A tend to pass towards the direction B.

Consequently there will result a shortage of electrons at A and an excess of electrons at B. These two terms shortage and excess are of course used in relation to the normal rate of the number of electrons, which brings the lead to its neutral state from the electrical viewpoint.

In other words, there will appear a negative electrical charge on the surface B and a positive electrical charge on the surface A. This movement of electricity will take place until the field h^1, due to these charges developed by the electrical influence, will have completely neutralized the field h at every point of the metal (except at the points situated at the exterior surface of the cable) and at every point of the vacant space situated in the interior of the metallic covering. At each of these points, the resultant electric field $(h+h')$ will be zero, beginning at the moment when the charges through electric influence will have had sufficient time to be produced. From that time on the condition of electric equilibrium will be realized and the conductor envelope or covering will constitute a perfect electric screen, placing all points situated in the interior of the cable sheath under the protection of the exterior electric field h.

The time necessary for the charges to be produced through electric influence, or, speaking in other terms, the time necessary so that the state of electric equilibrium be attained, is extremely short in the case of metallic coverings. Consequently this property of electric screens can be considered as rigorous and unchanging not only in the case of a stable electric field h (i. e., constant as to time) but also in the case of a very slightly variable electric field h.

If, for example, we displace the electrified bodies along the whole length of a telephone cable section, or, what amounts to the same thing, if, as a result of the movement of electric locomotives on an electric line of traction, using direct current, the potentials of the different points of contact wire vary slightly, and as a consequence the electric field around this contact wire itself changes slightly, then the electric field at any one interior point in the sheath of the cable will remain unchangeably zero at every instance. The conductors of a telephone or a telegraph cable running parallel to an electric traction system with direct current are there-

fore perfectly safe from electrostatic induction.

If the exterior electric field h varies rapidly with the time, which is the case where alternating current is used, if for example it is a sinusoidal function of the time of period T defined by the equation $h=ho\text{Sin } 2\pi\frac{t}{T}$ we do not have the right any more to expect à priori the same phenomena in regard to the electrostatic conditions. At any point situated in the interior of the cable (be it metal or be it space) we must consider not only the electrostatic field which we will have when stabilizing the electric charges in the state and at the points where they are found at the instant considered, but we must consider as well the field of electric induction due to the movement of electricity, a movement which brings about notable changes of energy between the different parts of the field. The total electrical field results of the superposition of these partial fields.

It is easy to establish approximately in a simple way why this entire electric field must be zero in the interior of a metallic body, even in the case of a movement of electricity.

We know that Joule's law as relates to electric conductors of any form whatever can be expressed in the following manner: the heat liberated in a unit of volume within a unit of time at any point where the intensity of the electric field is h has for its expression $W=ch^2$, c designating the power of conductivity of the conducting substance at the point considered. As a matter of fact it is sufficient to consider an elementary conductory of section σ, of length dn: its resistance is $\rho\frac{dn}{\sigma}$, ρ being the resistivity. The intensity of current which traverses it is $i=\frac{h\sigma}{\rho}$; the quantity of heat liberated in a unit space of time is: $ri^2=\frac{h_2}{\rho}\sigma dn$; the amount of heat liberated per unit of time in a unit of volume is then $W_j=\frac{ri^2}{\sigma dn}=\frac{h}{\rho}=ch^2$.

On the other hand we also know that the energy of an electric field per unit of volume is $W_c=\frac{kh^2}{8\pi}$, k being the electric inductive power of the material used at the point where the unit of volume is considered.

We have then:

$$W_j=ch^2=2\frac{4\pi c}{h}\frac{k\,h^2}{8\pi}=\frac{2}{\theta}W_c,$$ placing $k=4\pi c\theta$.

The bodies called conductors are therefore bodies such that, when an electric field is created there, the electrical energy is dissipated by transformation into heat with a speed represented by the fraction $\frac{2}{\theta}$ (θ has in effect the dimensions of time), which depends only on the nature of the bodies used as conductors.

Fig. 1.

In other words, when the losses of electrical energy are not made up from some external source, the electric field tends to dissipate in the conductors.

In order to obtain an idea of the law which regulates this dissipation, let us suppose that the telephone cable under discussion be a homogeneous cylinder of lead of a section AB, placed in an exterior field, which has at any instant t the value h, and let us liken this lead cylinder to a condenser, whose faces A and B are armatures and whose lead constitutes the dielectric. Let us suppose that at the instant t this pseudo-condenser with a conductor-dielectric ceases to be subjected to the influence of the exterior field and is discharged spontaneously. Under these conditions the electrical energy of each element of volume is reduced within time dt by a fraction $\frac{2dt}{\theta}$, which is the same everywhere. As this electrical energy is proportional to h^2, h is everywhere reduced by the same fraction $\frac{dt}{\theta}$, which does not modify the equi-potential surfaces and does not destroy the electrostatic equilibirum.

We have then $\frac{dh}{h}=\frac{dt}{\theta}$; whence we obtain: $h=h_0e^{\frac{-t}{\theta}}$. Thus the field is weakened following an exponential law and the constant of weakening effect is $\frac{1}{\theta}$.

In the real cable (of heterogeneous section, since the lead sheath contains copper conductors insulated by paper and air) the law relating to the weakening effect of the field is not the same any more, for the variation of electrical energy, and consequently that of the field $\frac{dh}{h}$, is not the same any more at various points, the state of electrostatic equilibirum being constantly destroyed. But in this case, at every instant, the portions of the field least weakened, (air and paper) tend to send energy to the portions weakened to a higher degree (copper and lead) and, although the preceding reasoning cannot be applied in all its force, we can conceive that one obtains through lack of the preceding simple exponential law, a phenomenon of the same nature and of the same magnitude.

In order to appreciate the average speed of dissipation of the electric field in the interior of conductors characterised by the constant of time θ, it is sufficient to calculate θ by the relation $K=4\pi_c\theta$. When designating the value of inductive power of a metal like copper by p, we find the same to be equal to $\theta=1.4\ 10^{-19}$ per second, which shows its incredible speed. For lead this value is about the same.

We see clearly that the electrical energy is dissipated in the conductors with inconceivable speed, characterised by a constant of time θ of the order of 10^{-19} seconds at the least. As regards this constant of time, the period of variation of the electric field due to a monophase electric traction line for example ($T=\frac{1}{16}$ or $\frac{1}{20}$ per second) is enormous. The electric field which would tend to be created at any instant in the interior of a metallic sheath would likewise tend to be dissipated just as quickly.

2. *The Magnetic Field of a Telephone Cable Running Parallel to a Traction Line*: Let us assume that the disturbing traction line be traversed by a variable current, which at any given instant is the same at all points

of this line, but which varies with time, following a sinusoidal law for example. There will result along the exterior of the telephone cable influenced a uniform magnetic field along the entire length of cable, varying according to the law: $Ho \sin 2\pi ft$, f designating the frequency of the traction current. This magnetic field H induces in the lead covering of the telephone cable some Foucault currents, which according to Lenz' law create in their turn a magnetic field H' of opposite tendency. The magnetic field in the interior of the lead sheath, i. e., the magnetic field which really affects the telephone currents, will be the resultant between the two fields H and H'.

But it is easy to see that the component H' is negligible when taken in relation with the component H in the case of the usual parallel runs between lines of traction and telephone cables, or, in other words that the influence of Foucault currents is very slight. This is due, first, to the fact that lead has a relatively high resistivity, and second, because the position of the lead sheath in proportion to the field H is not at all favorable to the formation of these currents.

In order to take account of the extent of the relation between H and H', let us make the following calculation. Let us suppose that the lead sheath instead of being a cylinder of external diameter D and of thickness e, is a prism of a square section with a side D and a thickness e (Fig. 2).

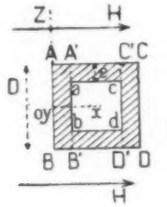

Fig. 2.

Let us suppose that the exterior magnetic field H is perpendicular to two of the faces of this prism.

We can decompose this hollow prism with its square section into four plain prisms, having for sections respectively the rectangles AA' $B'B$, CC' $D'D$, $A'acC$ and $B'bdD'$. We will have a maximum value for the magnetic field H' in the adjoining fields H'_1 H' H' H', created at the centers of each of these prisms by the Faucoult currents developed in these prisms which we imagine to be insulated.

Let us then consider the first rectangular prism of section $AA'B'B$, as if it were placed by itself in the magnetic field H. On its front face AB let us trace two axes $y'oy$ and $z'oz$ and let us likewise trace another axis oz (Fig. 2b).

The thickness e and the diameter D of the cable being negligible when compared to the length of the cable L (the length being considered as the distance that telephone cable and traction line run parallel) we can admit that the trend of the currents developed in the prism under discussion will have the direction indicated by the arrows (Fig. 2b).

Then let us consider a section of the lead prism situated at a distance z from the plane xoy and having for dimensions: a unit of length (say 1 cm) in the direction oy and the direction ox and let it be dz in the direction oz. The section following the plan yoz will be the shaded rectangle shown in Fig. 2b. The electric conductivity of this section is

$$dz \times 1$$

c——, c being the conductivity of the lead.

The magnetic flux cut by this section of the prism is $H \times Z \times 1$. The electro-motive force induced in this section is then:

$$dE = \frac{2\pi}{\sqrt{2}} fHz = 2\sqrt{2}\pi fHz.$$

This electromotive force produced in the prismatic section a Foucault

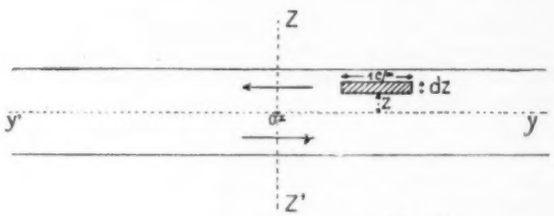

Fig. 2b.

current whose intensity is expressed by an intensity:

$$dI = dE \times c\,dz = \sqrt{2}\pi fHcz\,dz.$$

The entire Foucault current induced in a section of height D and of length of 1 cm. and thickness of 1 cm. will then be:

$$I = \int_{0}^{D^2} dI = \frac{\sqrt{2}\pi}{8} D^2 + fHc.$$

For a length of cable of L-cm. and with a thickness of e-cm. the total Foucault current created in the rectangular prism of section $AA'B'B$ will therefore be:

$$\frac{2\pi}{8} \times \frac{eD^2}{L} \times fcH,$$

since the conductivity is directly proportional to the section and is consequently inverse to the length.

The magnetic field produced by a circular current I at its center being $4\pi I$, we have a maximum value of field produced at the center of the prism under discussion by the Foucault currents developed in this prism, when we take for H'_1 the expression:

$$H'_1 = \frac{\pi^2}{\sqrt{2}} \frac{eD^2}{L} fcH$$

On the other hand we have $H'^2 = H'_1$ and in a like fashion:

$$H'_3 = H'_4 = \frac{\pi^2}{\sqrt{2}} \frac{(D-2e)}{L} e^2 fcH$$

As a result a maximum value of H' will be:

$$\frac{\pi^2}{\sqrt{2}} fcH \left\{ \frac{eD^2}{L} + \frac{(D-2e)\,e^2}{L} \right\}$$

let us place:

$$f = 16^2 C = \frac{1}{20 \text{ microohms/cm.}} =$$

$0.5\ 10^{-4}$ c.g.s.

$$e = 0\text{cm.} \quad 5D = 5 \text{ cm.}$$

$L = 1$ Km. $= 10^5$ cm. (parallel run of 1 km. only).

We will then have for the ratio $\frac{H'}{H}$ the maximum value

$$\left\{ \frac{\frac{\pi^2}{\sqrt{2}} \times 16 \times 0.5\ 10^{-4}}{\frac{0.5 \times 25}{10^5} + \frac{4 \times 0.25}{10^5}} \right\}$$

of the order of 10^{-7} that is to say, entirely negligible.

Consequently for all telephone lines in cables running parallel to electric traction lines, whether there be subscriber lines, or trunk wires between different exchanges, or long distance lines, we can admit that the magnetic field due to the traction line is the same on the exterior as in the interior of the lead cable sheath.

In resumé, if we consider a line of electric traction and of telephone circuits or of telegraph lines of double-wire construction placed in a cable, whether aerial or underground, the

role played by the metallic covering, from the viewpoint of protection of telephone and telegraph circuits against the disturbing action of the traction line, is the following: It places the circuit completely under the protection of electrostatic induction; it has no sensible action from the viewpoint of electromagnetic induction.

Further, if we consider a particular circuit, as for example a telephone circuit, we must separate the electric field from the magnetic field and consider only the latter. This field induces into the circuit: First, a transverse voltage, i. e. a difference in potential between the two wires of the circuit. which tends to make a current traverse these two wires in series. These two wires being twisted together in form of a helix with very small pitch, the effect will in general be slight, in spite of the importance of the inducing magnetic field. Second, a longitudinal voltage will result, or in other words a difference in potential between the two wires in parallel and the ground. In order to understand the creation of this longitudinal voltage, we need only consider the circuit as having the outgoing conductor in shape of the two telephone wires strung in parallel and as return conductor the lead sheath of the cable. We may assume this circuit to be closed by some condensers representing the capacity between the two telephone wires and the lead sheath, a capacity which is distributed along the entire length of the cable. The area if such a circuit can be quite considerable if the parallel running between wires and traction line be for any great distance. For a parallel run of 1 km. in length the area is already near 10 square meters, assuming that the telephone conductors under discussion be distant 1 centimeter from the interior surface of the lead sheath. Under such conditions we can easily see that the variable magnetic flux which traverses such a surface induces important differences of potential between the telephone wires and the lead sheath of the cable.

We can liken, if we wish, the two wires of a telephone circuit running parallel, to the conductors of the stator winding of an alternator; this conductor instead of being placed in a shell of iron may be assumed to be enclosed in a shell of lead. We know that a difference of alternating potential is established between the two extreme ends of a stator conductor under the influence of a magnetic field of constant intensity rotating with the poles of the rotor; likewise under the influence of the fixed field, whose intensity is however periodically varying owing to the changes brought about by the vicinity of the electric traction lines, changing potentials in relation to the ground will appear at the extreme ends of the telephone circuits contained in the lead cable which run parallel to the traction system.

However we may look at these phenomena, the creation of these longitudinal voltages between the earth and the telephone wires are produced without doubt by the effect of electromagnetic induction. Even though the metallic sheath be a perfect electric screen and even though the various conductors in the cable be twisted together with the utmost care, sending of current through these wires will always take place with some risk of disturbances through induction effects and may even cause dangerous potentials on these lines.

What has just been said refers just as much to lines of traction using single phase as those using the triphase system. Likewise we meet similar results with lines using direct current, for the magnetic field created by such lines of traction is far from being constant. The cause of this state of affairs is due to two reasons: 1. The principal portion of this field, while called direct, varies greatly with the time following the movement and the charge of electric trains. 2. This field possesses moreover some periodically varying components, the variations being different depending on numerous factors.

3. *Various Manifestations of Disturbances to Telephone Lines*:—The reason why electric traction lines cause a great deal of trouble to parallel running telephone lines due chiefly to electromagnetic induction, may be summed up in the following: 1. The current running through the contact wires (usually the charged trolley wire or heavy feed wire) is of great importance. 2. The return circuit in most of these systems is effected through the ground so that the area of the inductor circuit is tremendous. 3. The lines of traction owing to their nature and the service which they have to perform are more subject than any other lines of energy to abnormal conditions and are subject especially to short circuits. The different manners in which disturbances from traction lines show in telegraph and telephone lines may be divided as follows:

1. *Troubles of Service*: (a) Total interruption of telephone and telegraph service. (b) Faulty calls. (c) Noises on wires that make hearing impossible or at least attended with great difficulty. (d) Disturbances in the signals sent over the wires by operators.

2. *Damage to Material*: (a) Risk of fire owing to short circuits especially. (b) Magnetization of Pupin coils placed at various distances on the telephone cables or on the overhead telephone wires on long distance lines.

3. *Accidents to Telephone Users.* (a) Electric shocks owing to direct contact between high and low tension wires or through induced high voltage. (b) Acoustic shocks caused by abnormally loud noises which are sent over the wires into the receivers and may cause injury to the ear of the person using the telephone receivers.

We shall briefly examine these various groups of disturbances, showing what their causes are and what remedies can be applied to remove the troublesome effects or at least to mitigate them as far as possible. (To be concluded.)—*Annales des Telegraphes et Telephones.*

Wireless Telephones for Border Airplanes

In connection with the patrol of the Mexican border by airplanes, Col. James E. Fechet, Southern Department Air Service officer, has announced that wireless field telephone equipment will be installed on all border planes at an early date. The equipment has been ordered and is now en route for use in the department, he stated.

Planes now being used on the border are equiped with high-powered radio sets enabling messages to be received at long distances. However, the planes are unable to carry the heavy sending set and cannot send out messages. The telephone equipment permits the transmission of messages both ways, though at a more limited distance.

One of the chief difficulties of the recent punitive expedition into Mexico was the inability to keep a constant liaison with the cavalry troops. The addition of the wireless equipment and a ground receiving set will be of great benefit in relieving this situation, according to Col. Fechet.

Engineering Features of the C. A. X.

Read Before the Automatic Telephone Engineers' Conference in Chicago.

By H. F. OBERGFELL*

THE community automatic exchange, known as the C. A. X., has been designed to meet the telephone requirements of exchanges serving small towns or rural communities.

This equipment was designed not only to meet the telephone requirements in an efficient manner and eliminate the services of the operator, but to give continuous, uninterrupted automatic telephone service with the least possible operating and maintenance expense. In many cases the C. A. X. is not readily accessible from the central or main exchange, especially during the spring and winter seasons. Recognizing this fact, the equipment was designed to operate automatically to the fullest extent so as to furnish uninterrupted telephone service.

Owing to the C. A. X. being the youngest and least known of the automatic telephone systems, I would like

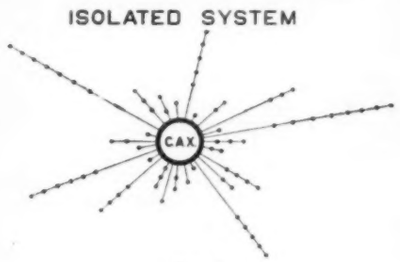

Fig. 1.

to refresh the readers' memory on the essential points.

Four types of systems may be considered:

1st, The isolated C. A. X.

2nd, The tandem C. A. X.'s.

3rd, The radial or satellite C. A. X.'s.

4th, The network system of C. A. X.'s.

THE ISOLATED C. A. X.

The isolated exchange is relatively rare. It has no connections to other exchanges and therefor the service requirements are of a simple nature.

Fig. 1 illustrates a C. A. X. of this character. Individual and party line service can be given to town subscribers and rural line service to the country subscriber. All calls are made automatically by the calling subscriber.

TANDEM C. A. X.'S

The tandem C. A. X.'s may be connected by means of only one toll line as shown in Fig. 2. This toll line not only serves for toll connections between the C. A. X.'s but also serves as a toll line to distant points. A C. A. X. can be installed in each town, with individual and party lines to town subscribers and rural lines serving the country subscribers. All calls within each C. A. X. are made automatically by the calling subscriber. The toll office may be located wherever it will receive the best attention, either at one of the C. A. X.'s or at the distant end "M", which may be either an automatic or manual exchange. Services such as information, complaint, etc., can be cared for by the distant toll operator or may be handled locally by any suitable person.

Referring to the diagram let us assume that the toll operator is located at the main exchange "M". If a C. A. X. subscriber desires to call a subscriber in one of the other C. A. X.'s, he automatically calls the toll operator and she will automatically set up the connection and control it. It is obvious that each of these C. A. X.'s are connector systems, the toll operator must employ a selector switch to select any of the C. A. X.'s. As all the C. A. X.'s are connected by means of one trunk, each C. A. X. has a selector switch connected to this trunk. The first level of the selector at C. A. X. No. 1 will be connected and all others left open. At C. A. X. No. 2 the second level will be used. At No. 3 the third, and so on.

A C. A. X. subscriber in No. 5 desiring to call a party in C. A. X. No. 2, calls the toll operator. The trunk is at once made busy to all other calls. The toll operator dials simplex back over the trunk (the C. A. X. subscriber has dialled over the loop). All selector switches except at No. 5 will step up to the second level, which is connected to a connector in C. A. X. No. 2. The remaining digits operate the connector switch, which will connect to the called line. If a C. A. X. subscriber desires to call into the distant main exchange "M" or beyond, he also automatically calls the toll operator.

The toll operator may be located at any one of the C. A. X.'s and set up and control two calls between the C. A. X.'s.

Traffic is facilitated by having two toll lines. One can be restricted to through service and used by the toll operator only and the other can be used both by the C. A. X. subscribers and toll operator, as previously mentioned.

RADIAL C. A. X.'S.

The radial or satelline system of exchanges consists of a central exchange, either manual or automatic, connected by radial trunks or toll lines to outlying C. A. X.'s. Fig. 3 represents a typical layout in which "M" is the checking center or controlling exchange for the group of C. A. X.'s.

Each C. A. X. completes its own connections automatically. If the "M" exchange is manual a C. A. X. subscriber desiring a connection to a station in another C. A. X. calls the operator at "M" who will dial the desired party. The connection between a C. A. X. and a manual subscriber in "M" is made by the operator in the usual

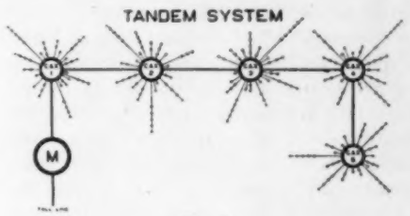

Fig. 2.

manner. Toll calls are made in the regular manner by calling the recording operator.

Should the central exchange "M" be automatic and free service allowed, a C. A. X. subscriber can dial any other C. A. X. as well as any main exchange subscriber. The automatic main exchange subscriber can dial any C. A. X. subscriber direct. For toll calls the C. A. X. calls into the main exchange and dials the toll operator.

If there is a charge for service between the C. A. X.'s and the main exchange, the C. A. X. calls the toll operator at the automatic main exchange "M", who completes and controlls the connection. Separate trunks can be run from the C. A. X. to the central exchange "M" so that combination toll and free service can be given if desired.

NETWORK SYSTEM OF C. A. X.'S.

Fig. 4 represents a layout of the network system, of which there are many possible combinations.

This system differs from the radial system, shown in Fig. 3, in that there

*Equipment Engineer Automatic Electric Company.

are direct trunks from some C. A. X.'s to some other C. A. X.'s. Adjacent C. A. X.'s may call each other freely. Calls from a C. A. X. to the central exchange subscriber may be free or charge as desired. This is also true of calls from one C. A. X. (as

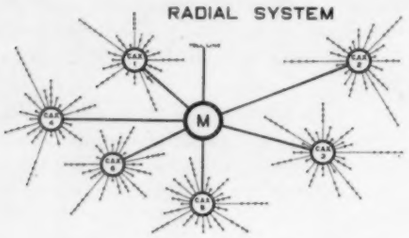

Fig. 3.

No. 3) to another C. A. X. (No. 7) not having direct trunks.

SIGNALING EQUIPMENT

Our experience on unattended automatic exchange equipment has shown that the rotary ringing machine is the most reliable type. The ringing machine is mounted on the power board and is equipped with jacks so as to be readily interchangeable.

In view of the enormous steps forward which have been taken by the telephone during the past decade, there will undoubtedly come a time when eight-party rural service will be the rule and when the ringing will be full selective. This already has been adopted at some points, such as Elyria, Ohio, and is certainly the ideal means of signaling, but many telephone executives consider that the expense involved is not justified today under the conditions they have to deal with, especially as very satisfactory results can be obtained by code ringing.

The C. A. X. offer two methods of code ring; one mechanical, controlled by calling two extra digits with the dial (giving a four-digit number), and the other by means of push buttons.

The whole theory of automatic telephony is based upon the principle of machine operation, and the tendency of the telephone art since its inception has been in this direction. We have, therefore, developed a highly practical and reliable code ringing machine which can safely be left unattended, and which has given most satisfactory results. This code ringing machine not only generates the ringing current, but also furnishes the busy tone and the interruptions necessary for the individual line ringing and code ringing. The machine is designed for an ultimate of 20 codes and operates only when a call is made.

We recognize, however, that under certain conditions the push button ringing satisfactory meets the requirements, and we have put out a push button system by which the subscriber, after dialling a two-digit number, gives the required code by pushing a button provided on the face of the wall telephone, and on the base of the desk instrument. This, undoubtedly, has certain disadvantages, as for instance, the codes are not as sharp and well defined, and when giving free service to an automatic exchange equipped for automatic ringing certain complications occur, but it is entirely practical and satisfactory under many conditions and we maintain both standards to satisfy the varying conditions met in the field.

REVERTING CALL FEATURE

In the push button code ringing system the reverting call is made the same as any other call; merely by calling the directory number and pushing the button.

In the machine code ringing system a special reverting call number is dialed and the receiver restored to the hook. All the bells on the line will ring according to the code called. When the called party has answered the ringing current is disconnected from the line and the calling party then removes the receiver, which places him in the talking position.

CENTRAL OFFICE EQUIPMENT

The C. A. X. equipment consists of a main distributing frame, switchboard and power plant.

A main distributing frame provided with carbon block lighting arrestors and fuses is regularly furnished. This frame allows for the regular cross connecting feature.

SWITCHBOARD

The line switchboard is of the unit type and is completely assembled when shipped. Rotary line switches are used exclusively on account of being individually controlled and also being capable of serving a larger trunk group. This rotary line switch is arranged for an ultimate of 25 trunks.

50 to 100 rotary line switches are mounted on an upright. At the rear of the rotary line switches are mounted the local connectors. The connectors not only perform the functions of a regular automatic connector, such as connecting to a non-busy line, feeding talking battery, etc., but are arranged to select trunks to other C. A. X.'s or to central exchanges and permit through dialing to automatic exchanges. If a trunk group consists of two or more trunks the trunk number is called and if the first trunk is busy the switch will automatically rotate and select the first non-busy trunk. If all calls are busy the busy signal will be given.

In the connector system 100 numbers are available for lines and trunks. An illustration follows:

50 single lines.
41 rural lines.
3 trunks to an automatic exchange.
2 trunks to another C. A. X.
4 trunks to a manual exchange.

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100 total.

By inserting selector switches the system can be extended the same as a regular automatic exchange.

The switches for inter-exchange calls are mounted on another section, which is installed adacent to the line switchboard and power board. All of the Strowger switches are of the covered, horizontal relay type, using the cast iron frame. All units are encased by the same steel and glass cover.

POWER PLANT

A 48-volt storage battery consisting of 25 accumulator or storage cells and seven counter-emf. cells, is used. The counter cells are used to maintain a switchboard voltage of from 46 to 52 volts during the charge and discharge of the battery. The battery is mounted on a rack and connected by means of non-corrosive battery joints.

The power board is arranged to automatically control the battery voltage so that the switchboard voltage will be kept within the prescribed limits of 46 to 52 volts. The ringing machine is mounted on the power board panel and is readily removable in case of trouble. It is advisable to have a spare ringing machine for one or more C. A. X.'s, to be used in case of an emergency.

The power board is mounted on an upright and base similar to the switchboard.

CHARGING EQUIPMENT

One of the difficulties encountered in the C. A. X. has been with the power, or rather lack of power. The

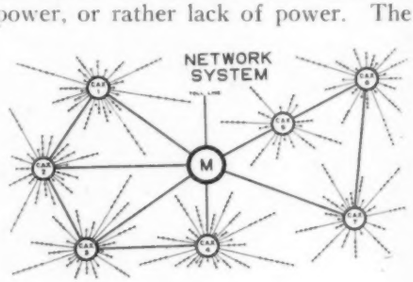


Fig. 4.

power board is designed to take care of "moonlight" or other irregular power service. By means of the automatic voltage regulating switch the automatic charging switch controlling the power to the motor is actuated when two or three counter cells are

still in the circuit, thereby preparing the circuit so that charging can be started when the commercial power is available.

If the power is available 24 hours per day the charge is started when the last counter cell has been eliminated from the circuit.

When commercial power is not available and a gasoline engine charging set is used, arrangements are made with a person in the vicinity where the C. A. X. is housed to start the engine periodically. It will be necessary for the attendant to first measure the specific gravity of the battery and then fill the fuel in accordance with a chart proportioned according to the specific gravity of the battery. The attendant will start the engine and after assuring himself that the charging set is operating satisfactorily, will leave it and the charging will proceed until the dynamo and battery is automatically controlled.

When irregular power service is available or a gasoline engine charging set is used, the power plant has a larger capacity than if the power were available 24 hours per day.

In all cases regardless of the type of charging sets used, the battery is given its regular equalizing or overcharge as prescribed by the manufacturer of the storage battery.

In connection with this, it would be advisable to mention that there are a number of farm lighting outfits on the market which are undoubtedly ideal for their purpose, but cannot be used for charging telephone batteries, that is, a single battery serving the switchboard.

A noiseless telephone generator is required for telephone service and practically all of the farm lighting outfits have the ignition circuit for the engine taken from the dynamo direct. This causes disturbances that cannot be readily eliminated or smoothed out by means of impedance coils.

The self-starting feature of reversing the battery into the dynamo for starting the engine requires such an enormous current draw that it causes an excessive voltage drop at the bus bars of the battery, thereby preventing the operating of the automatic switches. Furthermore, the small battery capacity necessary for the automatic switchboard does not allow for the heavy current draw required without buckling the plates and seriously injuring the battery.

For the above reasons, which our experiments have confirmed, it is not practical to use self-starting gasoline engine charging sets and we believe that it is the best policy to make arrangements with some party in the vicinity of the C. A. X to start the charge. A signal is automatically given when charging is necessary. The charge may also be started at pre-determined periods.

TELEPHONES

The C. A. X. central office apparatus is designed so that it is possible to use either common or local battery telephones, modified to meet automatic requirements. However, recommendations are to use common battery rural telephones where conditions are suitable, as the maintenance is considerably less than with local battery telephones.

To convert a magneto telephone into an automatic with code ring, it is necessary to attach a dial or calling device and attach the hook switch trigger arrangement unless the instrument is already provided with one. This allows for "listening in" before proceeding to dial. A condenser is connected in series with the ringer and the wiring is slightly changed so as to conform to the automatic circuit.

The magneto circuit is opened so as

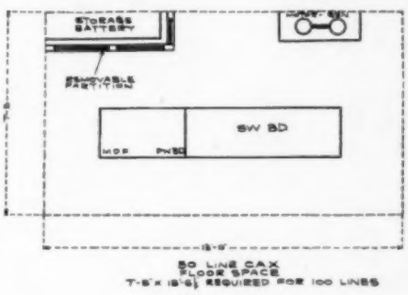


Fig. 5.

to make it inoperative and with this arrangement reverting calls are automatic. If the system uses push button ring, a push button is added. In this case reverting calls are made by means of the push button.

With the above arrangement (that is, loop dialing) the maximum number of telephones that can be connected to a line is 10 or 12 with 3600 ohm ringers in series with 0.2 mf. condensers. More than this would cause interference with the dial impulses, due to the condenser capacity.

Another system known as "simplex dialing" (automatic code ringing) is used where more than 12 telephones are required on a line or when the line is extremely long or not in good condition. No change is required in the central office equipment excepting that a repeater switch is inserted in the circuit between the telephone line and the line switch. With this scheme the changes in the local battery magneto telephone are similar to those described above, excepting that the ringer circuit does not require the condenser, but two hook springs are added for closing the calling device circuit. One side of the calling device is connected to ground and the other side through the hook springs to the center of the ringer coils. To convert this line to a common battery line necessitates a slight change in the wiring of the repeater only, and common battery loop dialing telephones. With the simplex dialing scheme reverting calls are taken care of by means of the magneto. The magneto is only used for this feature.

LINE CONDITIONS

We consider 100 ohms as the maximum loop line resistance when using automatic ringing cut-off operation and common battery transmission. For push button ringing the line resistance should not exceed 1500 ohms loop. The insulation resistance should not be less than 25,000 ohms for the entire line during extreme weather conditions.

Cleveland Wants to Buy Ohio State

The city of Cleveland is expected shortly to notify the Ohio State Telephone Company that it intends purchasing its lines at the expiration of the present franchise on February 17, 1921.

This, Law Director Fitzgerald says, must be done a year before the franchise expires.

Consideration of the proposal was given by Mayor Davis following a series of special meetings of organized labor here which adopted resolutions calling for the action.

"There is an overwhelming sentiment in organized labor to have the city take this step," said Fitzgerald.

Labor asks that the Ohio State lines be operated under municipal control for the purpose of competing with the Cleveland Telephone Company in an attempt to force a reduction in rates.

The telephone company's franchise provides that upon notice of one year before its expiration the city shall have the right to purchase the property without any consideration for the franchise rights. The franchise was granted February 17, 1896.

Fitzgerald said the city could purchase the company by issuing bonds against the property.

Gould Williams, head of the Ohio State Company, places the company valuation at present at approximately $10,000,000.

Telephone Patents Recently Issued

A Brief Digest of the Most Interesting Current Specifications

BY DAVID S. HULFISH

No. 1,306,706. Selective Signaling System. Issued to W. T. Powell, assignor to Automatic Electric Company, Chicago, Ill. A patent upon the general method of ringing upon the calling line. A ring-back apparatus is provided, which projects ringing current back through the linefinder terminals to the calling line, rather than through the connector terminals, for ringing stations upon the calling line.

1,306,804. Quick Release. Issued to H. D. Currier, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. A manual switchboard system, in which a relay is introduced into the cord pair at the answering plug, whereby the calling subscriber may release the connection and light his line lamp again, for another call. A differential cut-off relay is used in connection with the system of circuits.

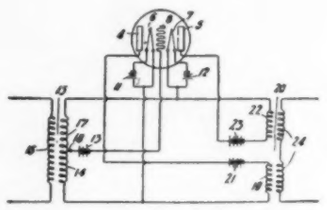
1,306,824, 1,306,825 and 1,306,826. Issued to F. Lubberger, B. D. Willis and T. G. Martin assignors to Automatic Electric Company Chicago, Ill. In a branch automatic exchange, a calling line picks up two trunks, one trunk to a connector within the branch exchange, and the other trunk to the main automatic office. In the progress of the call, it is determined which trunk will be required to complete the connection, and the trunk not required ultimately is released.

1,306,827. Linefinder Operation. Issued to W. T. Powell, assignor to Automatic Electric Company, Chicago, Ill. In a linefinder having a master switch which keeps all unassigned line switches or plungers opposite to a set of trunk terminals, it has been customary to keep the plungers opposite to an idle trunk. This improvement leaves them opposite to the last trunk seized, and shifts them only when another call is received and the trunk opposite to them is still busy.

1,307,489. Ringing Control System. Issued to A. H. Dyson, assignor to Western Electric Company, Inc., New York, N. Y. In an automatic telephone exchange, the toll operator may pick up a line whether busy or not, and may speak upon the line picked up. An arrangement of relay control provides that ringing current shall not be sent to the line picked up if that line has tested busy.

1,307,511. Speech-Repeater. Issued to A. McL. Nicolson, assignor to Western Electric Company, Inc., New York, N. Y. The relay is of the thermionic type, but is provided with five elements instead of the usual three elements. The two controlled elements have a common controlling element, for repeating speech in either direction on the line.

1,307,589. Linefinder. Issued to F. A. Lundquist, assignor to C. L. Redfield, Trustee, Chicago, Ill. In the linefinder, each trunk is repre-



1,307,511.

sented by a shaft having projections which are in the path of travelers associated with the lines. When a line traveler engages the first available trunk shaft projection, a connection is made between the line and the trunk at the location of the mechanical engagement, and the trunk shaft is moved to prevent other line travelers from engaging its projections.

1,307,688. Selecting System. Issued to F. A. Lundquist, assignor to Western Electric Company, Inc., New York, N. Y. In a selecting switch, where there are two sets of brushes which have access to two groups of lines, the first impulse from the call sender determines which set of brushes will be used in the connection then being set up.

1,307,977. Satellite Exchange System. Issued to A. E. Keith, assignor to Automatic Electric Company, Chicago, Ill. The exchange system described is made up of a central office of selectors in combination with numerous satellite offices each containing a line-switch unit. The patent bears an early date of filing, April 12, 1906, and the issued patent contains one hundred and fifty-five claims.

1,308,553. Linefinder System. Issued to W. T. Powell, assignor to Automatic Electric Company, Chicago, Ill. In a linefinder system having primary and secondary linefinder switches, provision is made for starting a line-switch unit. The patent switches at the same time to search for a calling line.

1,308,867. Switch. Issued to J. N. Reynolds, assignor to Western Electric Company, Inc., New York, N. Y. In this new design of automatic switch, three successive selections are provided for, thus making possible a 1,000-line switch upon the decimal system. Operating a first shaft selects the first figure; operating simultaneously two shafts selects the second figure; operating only the second shaft selects the final figure.

Lack of Service Brings Much Trouble

For the first time in nearly three months, telephone service has been resumed in full in Christian, Shelby and Montgomery counties, Illinois, the company having granted the demands of the striking telephone operators.

Death and disaster have followed the tieup, and the action of the Christian County Telephone Company in granting the demands of the strikers has brought relief.

Five deaths are attributed to the strike, injured or sick persons dying because of delay in summoning doctors.

A $250,000 fire at the Smith-Lohr mine also is blamed on lack of telephone service.

The strike originated in Pana, where the girls received $7 and $8 a week. They asked for recognition of their union and an increase of approximately 100 per cent in pay.

It spread to Taylorville, Stonington, and Kincaid in Christian County, Nokomis and Hillsboro, Montgomery County, and Shelbyville, Shelby County.

Miners and other unions supported the strike, paying the strikers their old scale.

The strike indirectly became connected with the strike of the railroad men on the Chicago & Midland Illinois railroad, which resulted in the strike of 1,200 miners.

Public Utility Commission News

Reports Concerning the Activities of State Regulating in the Telephone Field

Arkansas.

THE Arkansas corporation commission has granted a petition of the Judsonia Telephone Company for an increase in the rate to rural subscribers from 25 cents to 50 cents. This was done after a thorough investigation, which found that a rate of 50 cents is not unreasonable or unjust, being much less than is charged for similar service elsewhere in the state.

Illinois.

A large number of suspension orders in proposed increases of rates of out the state were made by the Illinois Public Utilities Commission. Practically every telephone company in the state is asking for authority to increase its rates. The commission between now and the time fixed by the commission in the suspension order, will endeavor to investigate the cases.

Among the suspensions are the following:

Beason Telephone Company in Beason, Logan county, to January 18, 1920.

Tower Hill Telephone Company in Tower Hill, Shelby county, to January 14, 1920.

Blue Mound Telephone Company in Blue Mound, Macon county, to Feburary 2, 1920.

Staunton Telephone Company in Staunton, Macoupin county, to January 16, 1920.

Waverly Telephone Exchange in Waverly, Morgan county, to January 9, 1920.

Chesterfield Telephone Company in Chesterfield, Rockbridge and Hettick, Macoupin county, to January 27, 1920.

Christian County Telephone Company in Taylorville, Pana, Morrisonville, Edinburg, Stonington, Owaneco and Kincaid in Christian county, to January 20, 1920.

Medora Telephone Company in Medora, Macoupin county, to January 27, 1920.

Jerseyville Telephone Company in Jerseyville, Jersey county, to January 18, 1920.

Indiana.

Connection and removal charges by telephone companies were discussed at a hearing before the public service commission in the house of representatives at Indianapolis, September 12. The hearing was attended by 100 or more representatives of telephone companies and municipalities throughout the state.

The hearing was to determine whether the charges put into effect by Postmaster General Burleson should be continued, whether they should be reduced, or whether they should be discontinued entirely. Rates were not discussed.

The charges are $3.50 for installing telephones, $3 for moving an instrument from one address to another, $2.50 for changing the name of a subscriber in the directory, and other charges.

At the hearing, which was conducted by Commissioner Paul P. Haynes, the telephone company representatives were unanimous in asking that the charges be continued and the representatives of Indiana cities were unanimous in their request that they be discontinued. The commission plans to issue, if possible, a blanket order covering the entire state. The Burleson rates are effective until December 1, unless changed by the commission.

The hearing was the first held in connection with the work of the commission in fixing rates and charges for nearly every telephone company in the state following the act of congress returning the lines to their owners. The commission has expressed its intention to make an exhaustive examination of the affairs of every company asking for increases or for the maintenance of the present high rates fixed by the government.

The Indiana public service commission has begun the task of straightening out the complicated Hoosier telephone situation scrambled by federal control, state control, unprecedented economic conditions generally and finally thrown back on the state commission in a sadly battered mass as a whole.

Paul P. Haynes, Fred B. Johnson and Glenn Van Auken are the commissioners who have charge of the work.

The biggest individual situation presented to the commission is that of the Central Union Telephone Company, which has petitioned for rate changes in thirty-three Indiana cities. The company obtained an increase in rates generally at the places when the federal telephone administration was in control and now that the federal rates automatically expire December 1 it has petitioned for continuation of or even higher rates than the federal administration authorized.

The commission had a number of Central Union cases before it when the federal administartion took control of the situation. Because of work done up to that time the commission has on file valuations of the Central Union properties at Auburn, Kendallville, Peru, Vincennes, Anderson, South Bend, Mishawaka, Crawfordsville, Shelbyville, Marion and possibly elsewhere. The commission will complete its valuations of the company's property at other cities and towns where increases are proposed.

The commission directed also that audits be prepared of the company's books and business at each of the places for which new rates are requested. Hearings on the Central Union petitions likely will consume the commission's time for several weeks.

Among the larger independent companies to be heard on proposed new rates are the Home Telephone and Telegraph Company, of Ft. Wayne, and the Home Telephone Company, of Lafayette.

The Ft. Wayne situation is complicated by the fact that the federal administration ordered increased rates and they were put into effect. On the other hand, the city of Ft. Wayne has petitioned the commission to order the company to reduce its rates.

The Lafayette situation is not so complicated, that company not having enjoyed any increased rates at the hands of the federal administration.

Among the companies to file for a commission order continuing in effect federally imposed rates is the Home Telephone Company, of Portland.

The entire situation will be cleared up somewhat by December 1, the commissioners hope.

In an order issued by the public service commission the Pendleton Telephone Company was authorized

to establish an increased schedule. The net rates authorized are: Business, individual, $2.25; two-party, $2; residence, individual, $1.40; four-party, $1.15 and rural, $1.40.

Michigan.

Notwithstanding the application to the public utilities commission by the Michigan State Telephone Company for permission to apply a new schedule of higher rates in Detroit, present rates probably will continue for a year or more.

When the commission took up the application it developed that first steps could not be taken until the inventory and appraisal of telephone properties in Detroit had been brought down to date by the city's engineers. All agreed that this would take from 60 to 90 days.

The commission gave notice that it would postpone hearings until the appraisal was completed.

While this arrangement for a start of proceedings to determine the Detroit rate was being made, the rate question throughout the state came up. There are 128 municipalities interested. In about 40 the company has inventories and appraisals not up-to-date. It was the attitude of the commission that complete appraisals must be made in all cases. This, it was estimated by the telephone company, would take nine months or a year.

It was decided that the company shall begin this state-wide appraisal and that each municipality shall have notice 10 days before the arrival of the company's force that the municipality shall appoint an engineer to go over the properties at the same time.

With this labor of a year in prospect, the question of toll service and its application to revenues and rates cannot come up. No opinion was expressed by any member of the commission but it was generally talked that a permanent rate for Detroit could not be reached until the state is in position to know values and fix rates for the whole of Michigan.

Representatives of the Michigan State Telephone Company informed the public utilities commission that the Michigan State company would take over the property of the Valley Home Telephone Company, and operate as one system in the Saginaw Valley. This will eliminate dual service.

Stockholders of the Valley Home Company, at a recent meeting, agreed either to buy or sell and it was announced that they would sell their holdings to the Michigan State Company at a price to be fixed by appraisers to be appointed by the public utilities commission.

Although neither party to the controversy regarding telephone rates in Detroit and in Michigan State Telephone Company exchanges throughout the state expresses itself as wholly satisfied with the temporary rates established by the public utilities commission, six years of wrangling and litigation appear to be at an end.

The commission itself is anxious to establish permanent rates as soon as may be, to get the telephone question off its hands before the railroads will come back under state jurisdiction and initiate a great volume of freight tariff cases. William W. Potter, who has charge of telephone matters, announces that the commission engineers are ready to begin envaluating telephone property as soon as the companies offer their co-operation.

Following are rates outside of Detroit:

Battle Creek, Jackson, Kalamazoo and Lansing: Business telephone, one-party, unlimited, per month, $4.25. Business two-party, $3.50; four-party, coin box service, guarantee of 10 cents a day for local messages at 5 cents each; refund of 1 cent per message in excess of guarantee. Residence, one-party, $2.50; two-party, $2.25; four-party, unlimited, $1.75; business farm telephone within six miles of central office, $2; residence, $1.50.

Bay City, Flint and Saginaw: Business telephone, one party coin box service 10 cents a day guarantee.

Residence, one-party, $2.75; two-party, $2.25; four-party, $1.75; business farm, telephone within six miles of central office, $2.25; residence, $1.75.

Ann Arbor, Benton Harbor, Calumet, Houghton, Menominee, Pontiac, Port Huron and St. Joseph: Business, one-party, $3.50; four-party, $3; residence, one-party, $2.25; two-party, $2; four-party, $1.75. Business farm telephone within six miles of central office, $2; residence, $1.50.

Albion, Bessemer, Big Rapids, Cadillac, Cheboygan, Charlotte, Crystal Falls, Dowagiac, Escanaba Grand Haven, Gladstone, Hastings, Holland, Iron River, Ionia, Ishpeming, Iron Mountain, Ironwood, Lake Linden, Midland, Manistee, Monroe, Marquette, Mt. Clemens, Niles, Norway, Negaunee, Petoskey, Sault Ste. Marie, Traverse City, Wyandotte, Ypsilanti.

The following are for battery exchanges. Those having magneto telephone are from 5 to 50 cents a month cheaper. Business, one-party, $3; four-party, $2.50. Residence, one-party, $2; two-party, $1.75; four-party, $1.50. Business farm telephone within six miles of central office, $2; residence, $1.50.

Alegan, Birmingham, Boyne City, Buchanan, Charlevoix, Chelsa, Coloma, East Jordan, East Tawas, Eaton Rapids, Fenton, Flushing, Grand Ledge, Greenville, Gwinn, Hillsdale, Harbor Springs, Holly, Howell, Lapeer, Marine City, Marshall, Northville, Otsego, Oxford, Plainwell, Plymouth, Portland, Rochester, Romeo, Royal Oak, St. Charles, St. Clair, St. Ignace, Trenton, Vicksburg, Wakefield, Watervliet.

Business one-party, $2.50; four-party, $2; residence, one party, $1.75; four-party, $1.50; business farm telephone within six miles of central office, $2; residence, $1.50. Switching for roadway company or associations owning their own lines and telephones, each telephone, 58 cents.

Communities of less than 1,500 population: Business, one-party, $2; residnce, one-party, $1.50; four-party, $1.25. Business farm telephone within six miles of central office, $2; residnce, $1.50. Switching for roadway companies or associations owning their own lines and telephones each station, $1.50.

Grand Rapids: Business, one-party, $4.50; two-party, $4; residence, one-party, $2.92; two-party, $2.33; four-party, $1.92.

Expenses of evaluating the telephone properties of the state by the state, estimated at $200,000 to $300,000—would be borne by the telephone companies themselves instead of the taxpayers of Michigan, under a plan discussed by the public utilities commission.

The appraisal is necessary, in the opinion of the commission, in order to arrive at the true value of the properties as the basis on which to fix rates for the future.

The companies will be reminded that it will be necessary for them to submit appraisals as a part of their proofs in rate proceedings and that the public can be spared the expense of two appraisals by the commission's tentative plan. The expense of appraisal by the company is passed on to the users through rates. If the

state pays this money comes from taxpayers.

The commission wants the companies to take part in the work of evaluating the properties at least to the extent of filing inventories. Thus the companies would be unable, in the event of court action to set up as a grounds for contesting that the commission omitted this or that from its inventory.

Information as to how values of telephone properties have been established in other states is now being sought by the commission to secure the latest ideas for doing this efficiently.

Attention of the telephone companies will be called to the fact that when the true values of the companies are once established a permanent foundation for rate-making will be available which can be kept up to date for future generations.

Missouri.

Burleson telephone rates, which were established in Joplin by the Home Telephone Company July 1, by order of the postmaster general, continued in effect, starting September 1, under a ruling recently returned by the Missouri state public service commission. Granting of the rate is a temporary measure and will continue for a period not to exceed four months.

A final hearing will be held in the meantime, establishing a permanent rate based on an application now pending before the commission for a higher rate.

Granting of the Burleson rate as a temporary measure followed a hearing of an application made by the telephone company and applies to the telephone companies of Joplin and Nevada.

Minnesota.

The Kenyon Telephone Company is permitted to place into effect, as of November 1, 1919, the following schedule of rates for local and rural telephone service at Kenyon, Minne-Nevada.

	Per Month
Individual Line Business	$2.75 gross
Two-party Line Business	2.50 gross
Business Extension	.50 net
Individual Line Residence	1.75 gross
Four-party Line Residence	1.50 gross
Rural Multi-party	1.50 gross
Rural Switching Charges	.35 net

All rates to be billed gross except where quoted net. All gross rates to be payable monthly in advance, with a discount of 25 cents per month if paid on or before the 15th of the month in which the service is rendered, excepting connecting company rural rates, which are payable annually in advance; and except that company rural rates are payable quarterly, with a discount of 75 cents if paid on or before the 15th of the first month of the quarter, a discount of 50 cents if paid on or before the 15th of the second month of the quarter, and a discount of 25 cents if paid on or before the 15th of the third month of the quarter.

The Mazeppa Telephone Company is permitted to place in effect, as of October 1, 1919, the following scehdule of rates at Mazeppa, Minnesota:

	Per Month
Individual Line Business	$2.25 gross
Business Extension	.50 net
Individual Line Residence	1.75 gross
Four-party Line	1.50 gross
Rural Multi-party (company owned)	1.50 gross

All rates to be billed gross except where quoted net. A discount of 25 cents per month to be allowed on all local gross rates if paid on or before the 15th day of the month in which the service is rendered. All rural rates to be paid quarterly in advance, with a discount of 75 cents if paid on or before the 15th day of the first month of the quarter; 50 cents if paid on or before the 15th day of the second month of the quarter, and a discount of 25 cents if paid on or before the 15th day of the third month of the quarter.

In the matter of the petition of the Four Lakes Rural Telephone Company for authority to discontinue the telephone service of Henry Sullwold unless the cost of materials and of constructing a certain telephone line to furnish the Respondent with telephone service be paid by him, it is ordered, that the respondent, Henry Sullwold, pay to the complaint, the Four Lakes Rural Telephone Company, the sum of $30.00 within thirty days of the date of the order, together with such assessments for dues and maintenance or service as have been levied against other members and may have accrued for the ensuing year. Upon failure of the respondent to pay the above prescribed sum within the time specified, the complainant may refuse to furnish him with telephone service.

The application of the West Concord Farmers Telephone Company to increase its local and rural telephone rates at West Concord Minnesota, will be heard in the director's room of the Farmers and Merchants State Bank in the village of West Concord, Minnesota at 1 p. m., on the 3rd day of October, 1919.

The application of the Fairmont Telephone Company will be heard at the Commercial Club Rooms, in the city of Fairmont, Minnesota, at 4 p. m., in Sherburne at 11 a. m., and in Ceylon at 9 a. m., October 14.

The application of A. O. Cole, doing business as the Minnesota Lake Telephone Company, to increase local and rural telephone rates at Minnesota Lake, Minnesota, will be heard at the village hall, in the village of Minnesota Lake, at 3 p. m., on October 15.

The application of A. E. Wilcox, doing business as the Bricelyn Mutual Telephone Company, to increase local and rural telephone rates at Bricelyn, Minnesota, will be heard at the Village Hall, in the village of Bricelyn, Minnesota, at 9 a. m., October 15.

The application of the International Telephone Company to increase its local and rural telephone rates at International Falls, Minnesota, will be heard at the Commercial Club Rooms, in the City of International Falls, Minnesota, at 10 a. m. on October 17.

Nebraska.

Assistant Attorney General Hugh Lamaster, in charge of railway commission affairs has filed suit in the district court asking a mandatory injunction to compel the Murdock, Neb., Telephone Company to install the uniform system of accounting required by the commission.

This is the first case where the commission has appealed to the courts to enforce the adoption of the new system, which some of the other smaller companies of the state are reluctant about installing, on the ground of the cost of maintaining it.

The commission takes the view that the hit and miss bookkeeping of the average small company leaves it impossible to determine how company funds are disbursed, when the question of adequate rates come up before the state body, and has ordered all companies to put in the uniform method.

The commission has also promised companies in poverty straits to see that they get rates adequate to meet the cost of the system.

The Murdock company serves 250 subscribers in Cass county. The law provides no penalty for a violation of this order, and the commission has

to rely on the penalties attached to a violated court order to enforce its demands.

The commission has asked the Tri-County Telephone Company at Stapleton, Neb., to file and get the approval of rates fixed arbitrarily on special service in that vicinity without recourse to the commission. The commission says an exchange was established at Tyron, Neb., and rates from this exchange were arbitrarily fixed.

Chairman Tom Hall of the commission held a hearing on the application of the Nuckolls County Telephone Company, which has been given 1,200 subscribers free service to five towns and has not increased its rates to meet wartime emergencies, for an increase of 25 cents a month on farm and residence and 50 cents a month on business lines.

N. J. Rodewald, one of two insurgent subscribers of the nineteen on the 40-mile farm line out of Seneca, Neb., who refused to buy stock in a farm company to take over the line some time ago, but who is willing to pay for service, has won his point against the company which removed his telephone. The commission held that he was entitled to service, but fixed his rate at $2.50 a month, the highest farm rate in the state, to meet cost of maintenance in the sand-hill distances.

The Palisade Telephone Company which has been giving free service to Hayes Center over a 16-mile farm line is denied the right to charge 20 cents a call by the commission, unless the company builds a special toll line.

A farm telephone association out of West Pont, Neb., is justified in cutting off service from George P. Hoy, a subscriber who eleven years ago put in low ash poles in violation of an association agreement that only cedar poles be used, according to a ruling by the commission. The association said line trouble was the most prevalent on the short poles.

The Cortland, Neb., Telephone Company has been granted a hearing to be held September 29 before the commission, for an increase in rates, which were denied recently on the ground that the company was not prepared to give class of service warranting higher rates.

The Lincoln Telephone Company has reported to the commission that improvements on farm lines from the Syracuse, Neb., exchange were about completed. The commission a year ago had refused to grant a rate increase until these lines were put in better shape.

After letting the Nebraska Telephone Company controlling all North Platte territory, know that it should not inject extraneous matters into rate regulation meeting the commission promptly allowed the change to be made after the reprimanded company had properly filed its application.

It concerned the abolition of local rates at the Waterloo, Neb., exchange substituting zone rates covering Waterloo, Valley and Elkhorn, the last two having zone rates themselves. The company showed that only eighteen of the 114 Waterloo subscribers had the lower local rates, and that it was impossible to police the service and keep them from the zone exchanges.

The commission is sending an engineer to investigate poor service complained of by Winnebago, Neb., business interests against the Matheny Telephone Company.

In accordance with the terms of its order last June the state railway commission has granted an increase in farm line rates to the Lincoln Telephone Telegraph Company at Hebron, Sutton and Carleton, following the reconstruction of rural lines connected with those exchanges. The new rates went into effect for September.

On the farm lines at Sutton the patrons are called by ringing them on selective metallic circuits. The rate for this service is $1.75. At the other two places, the old method continues in vogue and rural patrons pay $1.50.

When people "rubber" on the country telephones and wear out the batteries twice as quickly as they should, can they be compelled to buy new batteries for their stations?

Or, if the people use the company's telephone batteries to run gasoline engines and use two or three sets of batteries a year more than other people must they buy new batteries?

These are some of the quetsions that are troubling Manager A. R. Eng of the Edison Telephone Company of Edison, Neb. He believes these practices are going on on his lines and has written the state railway commission for advice.

The commission says the company does not have to purchase batteries for the subscribers to use on their gasoline engines.

New York.

The inquiry into New York telephone rates, which has been going on before the Public Service Commission, came to a mutually satisfactory end when the company voluntarily announced a reduction of 8 per cent to subscribers and a flat five-cent rate for all boroughs.

Ohio.

Telephone companies in Ohio will not charge $3.50 for installation of telephones on or after October 1. In an order issued by the state utilities commission at Columbus the rates are suspended and all Ohio companies are instructed to file new schedules by that time. The "service installation" charges were instituted at the instance of Postmaster General Burleson when the government had control of the wires. They were formerly from $5 to $15 and afterwards cut to $3.50. When the government restored the wires to private ownership, provision was made for the installation charges for a period of four months, except where the changes were made by state commissions.

The action of the state commission follows a hearing held several weeks ago in which telephone companies were invited to lay before the commission their reasons for asking for an installation charge. The Bell and Ohio State Companies took advantage of the opportunity and presented testimony at that time.

Testimony at that time was to the effect that companies were at large expense installing telephones by reason of the fact that statistics showed that 90 out of 100 users will abandon their telephones or move to another location every two years.

In its order the commission takes this into consideration, but calls attention of the companies to the fact, where there are removals in the majority of instances the telephone is not removed, but merely transferred to another subscriber, the "station" remaining the same.

The companies contended that a large part of the installation charge should be met by the subscriber who causes the expenditures to be made, calling attention to the fact that the short time telephone user puts a hardship on the long time user.

Testimony considered showed that in Columbus alone, less than 400 of 30,000 subscribers to one telephone company's service have been in the same location since 1905. The com-

mission contends that this testimony shows that there are conparatively few "long time" users, but that it does not show that telephones in the premises were removed because of the change of subscribers.

Maintaining that it costs an average of $8 to install a telephone, the companies contended that $3.50 should be borne by the subscriber without "restraining the growth of business." The commission holds that any part of the installation charge against the subscriber will restrain the growth of business.

To protect possible long time subscribers and to protect the company against short time users, the commission allows the companies to charge for three months' service at the time of installation, not to be refunded in case of removal within that time.

A charge of $1 is allowed as installation where one subscriber moves out and another moves in. The succeeding subscriber is assessed the installation.

Where telephones are moved from one part of a room to another, a charge of $1 is allowed and where telephones are moved from one room to another, a charge of $1.50 is permitted. For removal from one story to another, companies may charge $2. The commission holds that the subscriber only is benefited by these changes.

The charge for removal of any other apparatus when made at the request of the subscriber is to be based on the actual cost of labor and material.

Where a subscriber wants a telephone for a short time, the charge may be made at the discretion of the telephone company.

The Ohio commission is said to be the first to revise the Burleson rates and refuse the general installation charge, with the exception of Michigan, which state held that congress lacked jurisdiction to continue the rates for the four month period.

South Dakota.

Whether telephone companies, both Bell system and Independent, will continue to operate in South Dakota under the Burleson rates after December 1 is a question that the South Dakota railway commission has under consideration.

Informal conferences were held on the subject by representatives of independent lines and Oliver E. Sweet, attorney for the commission, D. E. Brisbine, a member and Ed Zempel; J. H. Steninger of Parker, president of the Independent association in the state representing their interests to ascertain what position the commission intends taking after that date when the present rate agreement expires.

Louis Vogland, the president, and Secretary Jensen of Parker, representing the Hurley Telephone Company, also appeared to confer with the commission as to what it might do in regard to the question of certain additional charges the company has been making to rural subscribers when calling the towns. The commission ordered this practice discontinued, maintaining that the regular rate should be sufficiently high to cover this service while the company contended that the flat rate was not adequate. It appealed the case to the state supreme court which decided in favor of the commission.

Under the present agreement, telephone rates in South Dakota will remain the same as they were while the companies were under government control, the rates established by Director Burleson continuing until December 1. The commission is holding hearings on applications of the companies operating in the state to determine whether these rates may be raised on that date and decisions will be made after all the evidence is obtained and considered. The Bell system, South Dakota State Telephone Company and the Dakota Central Company all have made applications to the commission to be permitted to raise their rates at that time.

Independent telephone companies operate approximately 90 per cent of the exchanges and the telephone wires in South Dakota, the Bell company operating largely in Sioux Falls and west of the river.

Wisconsin.

The Knapp Telephone Company, which operates an exchange at the village of Knapp, with less than 300 subscribers, applied to the Railroad Commission in June, 1919, for authority to increase its rates about 25 per cent. After the application was filed the Industrial Commission's minimum wage order was issued, and the applicant amended its order to ask for nearly 50 per cent increase in rates.

A study of the company's accounts and operating methods by the commission makes it clear that with the minimum wage law in effect, the company cannot pay operating expenses with the revenue received from its present schedule. The deficit for 1919 will be close to $700, leaving the matter of return on anvestment out of the question. Even with the increase in rates asked for the company cannot in the next year meet its total expenses.

The commission therefore issued an order authorizing the following rates payable quarterly in advance, otherwise a penalty attaches: One party line, gross $2 per month, net $1.75. All other lines, gross $1.75 per month, net $1.50.

The railroad commission authorized the Spooner Telephone company to increase rates on business, residential and rural lines.

Hearing brought out the fact that the minimum wage affecting female labor has increased the company's cost of operation about 40 per cent. The average operator's wage has been 10½ cents an hour. It was found that the company was running at a loss.

The commission rebuked the company for putting into effect new rates without submitting them to the commission for approval.

Changes in St. Paul Exchanges

Changes in the names of telephone exchanges to prepare for the unification of the manual and automatic systems in St. Paul, Minn., are announced by the telephone company.

The names of three manual exchanges will be changed, effective with the issuance of the November directory, while new prefixes or names were given to all the present automatic exchanges. The automatic prefixes, however, will not become effective until the two systems are unified early in the year.

Summit exchange will be changed to Elkhurst in November, the Robie exchange to Riverside, and Bomont to Tower.

The names of the Cedar, Dale, Midway and Jackson manual exchanges will not be changed.

The new automatic prefixes will be changed next year as follows: Main to Garfield, Dale to Forest, Park to Nestor, East to Van Buren, and South to La Salle. The automatic exchanges at present are designated by numbers.

Numbers will consist of four figures and an exchange prefix, as Garfield 1235. One directory will be issued.

State Commissioner Talks at Indiana Meet

"Service first" was urged as the motto for Indiana Independent telephone companies if more adequate rates are desired, by Paul P. Haynes, a member of the public service commission, at the convention of the Indiana Independent Telephone Association at the Claypool hotel in Indianapolis, September 17. "The people of Indiana are generally complaining of telephone service," Mr. Haynes declared, "and while the companies are giving consideration to the matter of rates, they should organize a vigorous state-wide movement for the improvement of service and the esatblishment of proper public relations."

Following Mr. Haynes's address, a motion to start a campaign for improvement of telephone service throughout the state, and also a publicity campaign to inform the public of actual conditions in the management of telephone companies, was carried with a few dissenting votes.

"Telephone companies are thinking about rates," Mr. Haynes said. "The public is thinking about service. There are those who contend that there is no relation between rates and service. To my mind this position is untenable. You can not divorce rates and service, for service is the thing which the rate pays for. If adequate service is not given the company can not expect a rate which presuppposes adequate service. There are mitigating circumstances, of course, but, generally speaking, telephone companies can not expect full measure rates when they give short measure service."

Mr. Haynes declared that he was well aware of the conditions under which telephone companies are required to operate. Bad service of the telephone companies is attributable to the inability of the companies to obtain and keep good operators, he said, because of the fact that they have been unable to compete with industrial concerns paying higher wages. Mr. Haynes told of instances of operators, who had just received a thorough training in operators' schools, leaving their employment with the companies to accept positions elsewhere. The telephone companies are not responsible for this situation, he said. Private and unregulated business establishments have been able to increase the price of their products and wages while concerns controlled by public commissions have been unable to do so, he said, and the public has not grasped the fact that the regulated utilities must meet the same conditions which confront private business establishments.

"In my judgment," Mr. Haynes said, "there is but one way by which the public will grasp this fact. That way is good service. The people of Indiana are fair-minded folks and usually are perfectly willing to pay adequate rates when companies render adequate service.

"I have observed that in a great many cases the management of telephone companies overlook or decry the necessity for proper public relations. The fact that a telephone company has a monopoly business is no reason why that company should not make every effort to secure and maintain the good will of the public. Courtesy and prompt attention to complaints are assets which can not be overestimated. The day of 'the-public-be-damned' policy is past and no company which consciously or unconsciously follows such a policy can hope to meet with a full measure of business success.

"There are those who insist that the public utility is so much a part of the public business that the public must share in the misfortunes and difficulties of the utility. There are elements of merit in this position. To the extent, however, that conditions which cause bad service are within the control of the company, the company alone must accept the responsibility. If a telephone company fails to improve service conditions when it is within its power to do so rate increases are not justified."

Mr. Haynes'ss address caused considerable discussion among the telephone men. F. O. Cuppy, of Lafayette, declared that there is a lack of confidence on the part of both the telephone men and the public service commission in each other. The telephone men were more to blame, however, he said, as they fear they will not get a square deal.

N. G. Hunter, of Wabash, declared that "the commission appears to have an atmosphere of suspicion and doubt respecting the honesty and good intentions of many telephone men who appear before it, according to the belief of many of these men." Mr. Haynes interrupted him to deny that this was the case, declaring the commission has never regarded any company with suspicion except "where they tried to cover something up in their records."

Mr. Hunter said he, himself, did not believe the commission had such an attitude, but that many telephone men apparently had this belief. He declared the companies can not give good service unless their operating revenues are increased.

A virtual reorganization of the association was effected just before adjournment of the morning session. A new constitution, providing for the admittance of all commercial telephone companies in the state into the association was adopted with but little opposition. The name of the organization was changed to the Indiana Telephone Association. It was said that the purchase of the Indianapolis Telephone Company, heretofore one of the strongest members of the association, by the Central Union Telephone Company, was partly responsible for the change. Heretofore only Independent telephone companies were eligible to membership.

A luncheon in the Riley room of the Claypool hotel at 1 o'clock, which was addressed by B. J. Mullaney, of Chicago, and W. S. Vivian, of Chicago, closed Wednesday's program. The convention adjourned Thursday morning.

Bell Official Predicts Automatic

E. D. Nims, vice president of the Southwestern Bell Telephone Company makes the statement that automatic telephones soon will be installed in every large city. Telephone companies find it impossible to secure and train sufficient operators for manual telephony and have turned to the automatic as a solution.

Automatic for Dallas

Substitution of automatic telephones for the manual instruments in Dallas, Tex., will begin as soon as manufacturing conditions are such as to enable the Dallas Telephone Company to get the necessary equipment and material for the change, according to J. E. Farnsworth, president of the company.

Ask Dad—He Knows

"Father," asked little Willie, "what is that little wire tied to the big one for?" pointing to the stranded-iron messenger wire supporting the lead-covered telephone cable.

"That, my son, is to keep the birds from standing on the big wire and getting shocked."—*Telephone Talk.*

Of Interest to the Trade

What the Telephone and Accessory Manufacturers are Doing to Advance the Art

Ships That Pass In the Air Need Telephone Service

Scott Field was an unusually busy place during the war with the turning out of efficient aviators as the chief occupation. This aviation camp with its large hangars and repair shops seemed like a small industrial center.

While the aeroplanes were humming overhead, the shop bustling and anvils clanking, the unseen telephone wires of the camp were ceaselessly throbbing. These wires terminated in a very busy spot of this active camp—the telephone exchange room.

"Ship No. 7 is off!" and immediately the flight tower advises the flight-record office. "Ship No. 13 met with an accident in landing and needs repairs immediately." In this way, a continual flood of calls flashed through the switchboard every day; in fact, all the cord circuits were in use practically all the time.

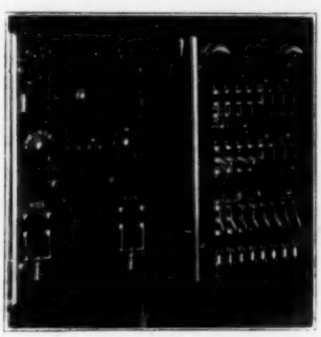
The operator stated that it seemed like operating a city switchboard all by himself with hardly a chance to breathe.

Scott Field, near St. Louis, Mo., was equipped with a 100-line Kellogg private branch switchboard, furnished with six trunk lines and seven cord circuits. One hundred and forty-one telephones were connected with this board, and in many offices it was possible to connect two telephones to the same lines, using the one and two-ring system of signaling.

The headquarter's, major's, engineer's adjutants, flight record, flight towers and hospital lines were equipped with red lamp-caps in order to facilitate the rendering of immediate service. Practically all telephones used throughout Scott Field were of Kellogg make and furnished unusually fine service. Aviators landing in the surrounding country were able, because of the extent of the service, to communicate promptly with their officers or headquarters from any point.

The Kellogg company also furnished the relay rack, power equipment and batteries. All the cable in the camp is underground.

This Kellogg Board Has Indeed Stood the Test After Severe Usage.



Scott Field Power Board.

Trunk Lines Enter the Camp on the Electric Light Poles and Go Underground to Exchange Building.

Western Electric Now Has Lighting Department

The Western Electric Company has recently added a lighting department to its general sales organization for the purpose of fostering the propaganda for better lighting in factories, offices, hotels, clubs and residences.

This new department has been placed under the direction of E. Cantelo White. Mr. White's experience in the electric lighting field covers a period of almost fifteen years, during which time his activities have covered both the United States and Canada as a salesman and designer of lighting equipment. Particularly in Canada, many of the most important lighting installations have been planned and sold by Mr. White and installed under his supervision

Mr. White is also well known to the electrical industry as the originator and designer of the "Duplexalite" line of lighting fixtures. In this connection Mr. White has done a great deal of standardization work and it will be his aim to carry on this standardization of lighting fixtures to such a degree that planning efficient lighting intallations and merchandising the equipment will be greatly simplified.

Stromberg-Carlson Magneto Switchboards

The Stromberg-Carlson Telephone Manufacturing Company's new Bulletin No. 1023 contains complete information regarding the No. 105 "High Efficiency" switchboard—a standardized central office equipment for magneto telephone systems.

The bulletin outlines the essential requirements of magneto switchboard equipment and illustrates, by many half-tone illustrations, circuits and diagrams, how these requirements are satisfied by the product described. This publication is full of data which should interest every telephone man, whether a potential switchboard purchaser or not.

A post-card addressed to the nearest office of the Stromberg-Carlson Company will obtain a copy for any of our readers.

Western Electric's Florida Branch

The Western Electric Company has recently opened a new branch, consisting of a sales office and warehouse, at 334 East Bay street, Jacksonville, Florida. This new member of the Western Electric family of distributing houses has been established for the purpose of enabling the company to give improved service to its customers in the extreme southeastern part of the United States. The house is in charge of A. H. Ashford.

A full line of electrical supplies and specialties will be carried at this house. This will include pole line hardware, cross arms and other pole line construction material; all inside wiring material; portable sewing machines, vacuum sweepers, washing machines, heating apparatus and all other electrical household appliances.

Instruments for Signal System Testing

"Electrical Instruments for Signal System Testing," an eight-page folder issued by the Roller-Smith Company, contains interesting information about portable-type volt-ammeters, direct-reading ohmmeters, and a new model volt-ammeter called the "Handy S. S." which weighs but 20 ounces, and measures 5 by 4 by 2 inches.

Literature on French Dry Cells

A considerable amount of varied circular matter on the subject of dry cells is being put out by the French Battery and Carbon Company of Madison, Wis., all of it of excellent character and highly interesting to users of the moistureless battery. The meaning of ammeter tests, the protective coating, and similar topics are treated in different folders.

Re-Employment of Soldiers.

Editor TELEPHONE ENGINEER:—Extracts from two telegrams from an Adjutant General of the Army to Recruiting Officers are herewith quoted:

Extract Telegram No. 1: "August 25th—Recruiting of applicants for American Expeditionary Force, Europe, will be resumed immediately for Infantry and SIGNAL CORPS. Enlistments may be for one or three years. Enlistment for one year being restricted to men with previous service. TELEPHONE OPERATORS and REPAIRMEN, Expert RADIO OPERATORS and TELEPHONE LINEMEN are especially needed for SIGNAL CORPS."

Extract Telegram No. 2: "August 28th—Make special efforts to secure QUALIFIED men for enlistment in SIGNAL CORPS. Urgent need of RADIO OPERATORS American Expeditionary Forces, Europe and Siberia and organizations on Mexican Border."

I am taking the liberty of presenting to you the facts set forth above for the following reasons:

(*a*) It is known that numbers of recently discharged soldiers, as well as other men, are without employment. Many of them may possess the necessary qualifications for the kind of work outlined in extracts Telegrams Nos. 1 and 2, quoted above.

(*b*) It is known that every effort is being made by business and industrial concerns, as well as by the Government to give employment to discharged soldiers as well as others, but many men are still unplaced and are therefore subject to certain hardships which will only increase, the longer these men are without work.

(*c*) It is believed that your paper is in a position to know especially well of cases of the nature set forth in paragraph (*b*) above, and therefore might find an opportunity to present briefly through your columns some news announcement pertaining to the opportunity set forth in extracts from telegrams Nos. 1 and 2.

(*d*) It is further believed that through your connections you may know of employment managers or superintendents of industrial companies who are unable to place men applying for work of a kind which would be useful in the Signal Corps.

(*e*) By informing such employment managers or superintendents of the Army's offer to qualified men for service in the Signal Corps, you would be doing the unemployed ex-soldiers a kindness as well as assisting such employment managers to aid men whom they are unable to place.

I have tried to make it clear that the idea is first and particularly, one of helpfulness to the soldier recently discharged; second, of benefit to other men, not ex-soldiers, but without employment, and third, a means of giving the Army the men it needs for important work that must be done.—J. T. CONRAD, Adjutant General.

Serves Stockholders Only to Escape Control

The directors of the Eureka Telephone Company of Corydon, Ind., passed a resolution to discontinue service to centers after August 31 and to limit service to stockholders of the company only. The object of this action is to remove the company from the list of public utilities of the state so that its business will not be subject to the rulings of the Public Service Commission which recently held that all users of service, whether stockholders or not, shall be charged the same rates and tolls, and also prescribed an accounting system that will make necessary the employment of a bookkeeper.

An assessment was ordered made against the stockholders of the company of two dollars each, payable in two equal installments, the first at the close of the present quarter and second six months, thereafter, to provide funds for the payment of a new switchboard which was ordered installed at a cost of $2,790. This is to be a modern board and it is said that it will add much to the efficiency of the service.

Minnesota's Network

Every community in Minnesota has a telephone system.

Most of these lines are operated by companies organized by farmers or residents of smaller towns and cities.

There are 1,735 organized telephone companies in the state.

These lines also have connections with lines of the larger companies. Long distance service thus is provided to any point.

Service Tests in Columbia, South Carolina

Telephone subscribers in Columbia, S. C., are getting good service according to a series of trial tests just concluded.

The lines were first tested Friday between the hours of 9 a. m. and 3 p. m. and from 6 p. m. to 1:45 a. m. Twenty-two calls were made between the day time hours and 15 operators took the numbers in five seconds or less. The fastest operator answered in 3 1-5 seconds and the slowest response registered 13 1-5 seconds. The average for the day was 5 3-5 seconds.

The operators responded to 31 calls between 6 p. m. Friday and 1:45 a. m. Saturady. Eleven operators answered calls in five seconds or less. The fastest response recorded was four seconds and the slowest was 27 seconds. The average for the night force was 8 2-5.

Saturday tests began at 9 a. m. and concluded at 10 p. m. The operators answered 36 calls up to 4:30 p. m. and 25 responded in five seconds or less. The fastest time was four seconds and the slowest was 35. The average for the day was 6 3-5.

The operators answered eight calls from 6 to 10 p. m. The fastest time was five seconds and the slowest 16. The average was 8 1-5.

The operators answered 27 calls last Monday between 9 a. m. and 4 p. m. The best time recorded was three seconds and the slowest was 27. Twenty calls were answered in five seconds or less. The average for the day was 6 4-5.

Eight calls were given between 6 and 10 p. m. Six answered in five seconds or less. The fastest time was 3 3-5 and the slowest 17. The average was 6 1-5.

Tuesday tests began at 9 a. m. and concluded at 5 p. m. Thirty-six calls were given and 22 were answered in five seconds or less. The fastest time was three seconds and the slowest was 27. The average for the day was 7 3-5.

Eight calls were given between 6 and 10 p. m. Three were answered in five seconds or less. The fastest call was five seconds and the slowest registered 13. The average was 7 3-5.

Thirty-four calls were given Wednesday between 9 a. m. and 4 p. m. Twenty-six were answered in five seconds and less. The best time was 2 3-5 and the slowest 17. The average was 5 2-5.

The night forces answered 28 calls from 6 p. m. to 1:45 a. m. Fifteen were picked up in five seconds or less. The fast time was 3 1-5 and the slowest 15. The average was 7 2-5.

The party making the tests encountered the various troubles that often cause complaints. Lines were busy, the wrong number was given in a few instances, noisy connections were manipulated and in some cases there was no response to a ring. The operators were given the privilege of taking their time in answering calls. The hook was not moved a single time during the tests. The receiver was lifted and the watch was stopped when the gentle voice responded with "Number," "Number, please," or "Operator."

Wichita Falls, Texas, Plans Automatic

Automatic for Dallas.

Plans for the installation of the automatic telephone system in Wichita Falls, Tex., are reported to be under consideration by the Southwestern Telephone Company in the near future.

Sufficient switchboard facilities for caring for 1,000 additional telephones here are in the process of installation at the local plant. The company has now on file in the neighborhood of 650 applications for telephone installations at the place.

An addition to the rear of the telephone company's building on the corner of Eighth and Scott to provide the additional room for switchboard facilities is a part of the program.

The installation of automatic exchanges, besides making possible the installation of sufficient switchboards to care for a greatly increased number of telephones will in a large measure solve the problem the company has been facing for the past several months in supplying sufficient operators to handle the business at the local exchange. The company has been obliged to import a number of girl operators from other points to handle the business, besides being put to considerable expense to provide proper housing accommodations for them.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

Personal Notes.

E. K. Hall, who was formerly vice-president of the New England Telephone and Telegraph Company, returned to the Bell System on September 1, as vice-president of the American Telephone and Telegraph Company. He will be associated with N. C. Kingsbury, who is first vice-president in charge of operation, and will give particular attention to relations with the personnel. His connection with telephone matters began some twenty years ago when he entered the Boston law firm of Powers & Hall, who were the attorneys for the New England Company of which he later became vice-president and a director. Mr. Hall is a graduate and a trustee of Dartmouth College. For several years he has been chairman of the American Inter-Collegiate Football Rules Committee and was business director of the Students' Army Training Corps during the war—remaining in the War Department after the armistice, in charge of settling the contracts between the department and the college. He has long been closely connected with the Boston Chamber of Commerce of which he was vice-president and he represented that body in the National Council of Chambers of Commerce of the United States. He is widely known, not only as a telephone executive, but also as an authority on civic matters and on business and public relations. Since January, 1917, he has been vice-president of the Electric Bond and Share Company of New York.

F. H. Van Gorder has been appointed manager of the Newark Store, of the Western Electric Company. Mr. Van Gorder went with the Western Electric Company in the spring of 1907 as a salesman connected with the company's Chicago house. In the spring of 1914 he was mades sales manager of the Detroit store. In June, 1918, he took up the duties of power apparatus specialist

at the company's New York office, which position he held until his promotion to the managership of the Newark store.

J. D. Andrews, district manager of the Southern Bell Telephone Company, in Mobile, Ala., has been promoted to be district manager of that company at Atlanta, Ga. Mr. Andrews has been in charge of the company's office in Mobile for the past twelve years, and his promotion comes as recognition of the manner in which he has conducted his office.

G. C. Bowden, assistant manager of the Cumberland Telephone Company, at Memphis, Tenn., has been appointed district manager at Mobile to succeed J. D. Andrews. Mr. Bowden has been associated with the Bell system for 13 years and has advanced rapidly. His promotion to the Mobile office was won by successful records elsewhere and he is regarded as being particularly qualified to carry forward Mr. Andrews' work in Mobile.

Appointment of Hunt Chipley, Atlanta attorney, to be vice president and counsel in general charge of all legal matters for the Southern group of Bell telephone companies was made by President J. Epps Brown.

George Lathrop, lineman for the Citizens' Telephone Company, at Ingham, Mich., for three years, has accepted the position of manager of the office as successor to Mason E. Reynolds, who has established a real estate office. Mr. Lathrop has had a great deal of experience in the telephone business, having worked at the Bell office in Lansing for some time and in Jackson for the Consumers' Power Company.

G. M. Parsons has sold the Delight Telephone Company at Delight, Ark., to Ed Kirkham. Mr. Kirkham contemplates putting in several hundred feet of cable.

S. E. Gill, of Virginia, Ill., has purchased the Arenzville Telephone Company business at Arenzville, and took possession September 1.

E. D. Smith, prominent attorney of Birmingham, Alabama, member of the National Democratic Committee, has been appointed general solicitor in direct charge of the legal department of the Southern Bell and Cumberland Telephone Companies, reporting to the vice-president and counsel. Mr. Smith will have his office in Atlanta.

The local telephone company at Durant, Okla., will be under the management of a woman hereafter, Mrs. W. J. Gideon having taken charge as the head of the Bell company in that city. Mrs. Gideon has been cashier at Sapula, for several months.

V. K. Turner has assumed the duties of general manager of the Perry County Telephone Company.

Eugene D. Nims, vice president of the Southwestern Bell Telephone Company in Kansas City in 1911 and 1912 and later in the same capacity in the St. Louis company, was elected president of the Bell company in St. Louis at a meeting of the board of directors there recently. He succeeded H. J. Pettingill, who became chairman of the board of directors.

W. E. Lyons, Piqua, Ohio, has been appointed manager of the Coshocton Telephone exchange to succeed J. L. Rue, resigned.

A. E. Elzey has purchased the Home Telephone Company at Ossian, Ind., from E. H. Roe, for a consideration of $3,500. Mr. Elzey will endeavor to sell this to the Pumpkin Vine system or to organize a stock company and establish an up town office.

George W. Seaman, for a number of years manager of the Fremont Home Telephone Company, at Fremont, Ohio, has tendered his resignation to the board of directors. Mr. Seaman, handicapped by ill health and physical disability, gave up his position in favor of a more active man and C. B. Forest expert telephone man in charge of the installation of the new system in Fremont has been appointed as general manager of the Home Telephone Company affairs. Mr. Forest, the new general manager, is a man of wide experience and was at one time employed as an expert by the public utilities commission at Columbus.

W. D. Haley, who for the past five years has been local manager of the Cumberland Telephone Company at Bowling Green, Ky., has been made district manager of the company with headquarters in Owensboro. His successor is Mr. Hamby of Mt. Carmel, Ill.

Earl F. Francis has terminated his official relations with the Ohio State Telephone Company as manager of the Portage County branch, and has been succeeded by Leon S. Hubbell, recently manager of the lines at Chagrin Falls.

George R. Smith, who has been officially connected with the Perry County Telephone Company at New Lexington, Ohio, for the past seven years, has resigned as General Manager, to accept a position with the Bell Telephone Company in Columbus. He is succeeded by Lieut. V. K. Curtis, of Nelsonville, formerly with the company at that place.

J. W. Dellinger, who has been superintendent of the Eureka Telephone Company at Eureka, Indiana, for a number of years, has tendered his resignation to the directors, which has been accepted. Mr. Dellinger will move to Maysville, Ky., where he accepted a similar position. Ben Frakes, of Eureka, who recently returned from the army, has been selected to fill the vacancy.

H. J. Kimbro, in charge of the Southwestern Bell Telephone Company at Blytheville, Ark., has been made manager of the entire county. This adds to his territory the exchanges at Osceola, Luxora and Wilson.

News From the Field

ARKANSAS

Better telephone service is promised Searcy patrons by the Southwestern Bell Telephone Company, which is arranging to put in new and greatly improved equipment.

CALIFORNIA

The Long Beach chamber of commerce will file an application for a hearing before the state railroad commission to protest against the poor telephone service furnished residents of the city. John L. Adams, head of the industrial bureau of the chamber of commerce, asserts the cutover was not properly installed when the systems were merged recently. The city commission is said to be in sympathy with the chamber's protest.

Subscribers of the Santa Monica Bay Telephone Company, in Sawtelle, are preparing to send their bills for the last two months in a bundle to the state railroad commission, with a letter telling of the lack of service before and after the strike.

GEORGIA

J. M. Dent, owner of the Douglas Telephone Company, has made application to the railroad commission of Georgia to increase telephone rates. The increase asked is, business telephones from $2.50 to $3.50, and residence from $1.50 to $2.00. Mr. Dent has obtained consent of the council to increase the rates.

ILLINOIS

City Attorney Taylor at Effingham has won his telephone case, and the telephone company has instructed

Mgr. Bushue to reduce the rates to those applying before the recent increase was made and to return the excess collected for August and September.

The Montgomery County Telephone and Telegraph Company has filed with the Public Utilities Commission of Illinois, schedules which will change the rates for telephone service at the exchanges of Hillsboro, Nokomis, Donnellson, Butler and Raymond, county of Montgomery.

An application was made by the Macoupin County Telephone Company to the Illinois Public Utilities Commission for an order authorizing an increase of rates for rentals of telephones in Carlinville and vicinity. A new toll rate between Carlinville and Chesterfield is also asked.

ILLINOIS

The Union Telephone Association, which serves the south part of Marion, the west part of Wayne, and the northeast part of Jefferson county met recently and elected the following officers: President, J. O. Harow; vice-president, and treasurer, G. L. Roberson; secretary, James M. Latta; lineman, Pearl Minor; trustees, J. D. Minor, Arthur Brookman, J. R. Edmison, W. G. Harris and W. A. Simmons.

A new switchboard system soon is to be installed at the federal building in Chicago. Preparations are under way to have four switchboards take the calls now handled by a single large board. Under the new conditions the number Harrison 4700, which in the past has been used for all departments, will be the number of the Postoffice Department only. The numbers of the other departments will be announced soon.

The proposed increased rate of the Plainville Telephone exchange in Plainville was recently suspended by the public utilities commission until January 23, 1920, pending an investigation by the commission as to its reasonableness. This same action has been taken in regard to all the petitions lately filed by telephone companies.

At the annual meeting of the stockholders of the Queen City and Shelby County Mutual Telephone Company, which was held recently at Shelbyville, Judge John McNutt of Shelbyville, F. W. Cherry of Cleveland and F. W. Kelly of Decatur were elected as directors to succeed the old board of nine directors, all of whom were Shelby county men. Judge McNutt represented 708 shares of the corporate stock of the company which he had bought during the past year for "foreign interests."

Officials of the Central Union Telephone Company told Mayor G. F. Johnson and City Attorney George D. Long of East Moline at the hearing before the state utilities commission in Chicago recently that the company is contemplating enlargment of its facilities in East Moline. Business has far outgrown the capacity of the present quarters, they said, and the company is seriously considering the erection of an exclusive telephone building, and the installation of a large service exchange.

That the United Telephone Company might have more time in which to complete a very exacting inventory of its properties, the petition for an increase of rates out of the Ottawa, Utica and Harding exchanges has been continued by the public utilities commission "without date."

Telephone rates in Springfield and a number of Illinois towns will remain the same until a new order is issued by the state public utilities commission This order will probably be out by October 1, the day when the increased rates put into effect by Burleson, expire. The cities and towns affected by the petition now pending are: Springfield, Rockford, Peoria, Quincy, Rock Island, Moline, Alexander, Beardstown, Brownstown, Buffalo, Cantrall, Decatur, Dwight, East Moline.

Proposed advances in telephone rates by the Citizens' Telephone Company affecting East Peoria were suspended until January 23, 1920, by the public utilities commission.

Recently the two telephone system service at Rockford was discontinued. The Rockford Home Telephone Company and the Bell Telephone Company will amalgamate and be operated by the latter.

An order of the public utilities commission, announced recently, suspends until December 22, 1919, proposed rates for telephone service of the American Telephone and Telegraph Company. Proposed rates of the Kinloch Telephone Company at Alton and Madison and St. Clair county points were suspended until January 6, next.

Illinois Local Telephone Company, 11 South La Salle Street, Chicago, has decreased it capital stock from $150,000 to $30,000.

INDIANA

The Home Telephone and Telegraph Company of Fort Wayne has filed a petition with the public service commission of Indiana, for authority to increase its rates.

Recently the Galveston Telephone Company elected the following directors: Wm. Campbell, R. C. Hyatt, D. A. Zehring, C. M. Harness, C. A. Loop, J. E. Kitchel and Wm. Countryman.

The United Telephone Company at Bluffton is planning the installation of a new system to replace equipment that was installed among the first in the country, and which has given unsatisfactory service for some time. The company has been gradually improving its plans and Marion and Huntington have had new plants installed.

The Harrison Township Better Farming Association is following in the footsteps of Jackson township and is organizing its own telephone company. Stock is being subscribed, and the prospects are reported to be bright. The stock will be sold within a short time and then the newly organized company will begin the real constructive work of getting material and getting the new line in operation. Their exchange will be at Lucerne and will also include the west half of Bethlehem township.

The annual meeting of the stockholders of the Citizens Telephone Company was held recently at the company's office at Fort Wayne. F. M. Schirmeyer, who has served as secretary of the company, since 1896, and who has been general manager part of the time, resigned and he will be succeeded by George Kinzle as manager and Herman F. Ehinger as secretary. Mr. Kinzle at present is serving a four year term as county treasurer, and his term will expire December 31, this year, and he will immediately enter upon his duties, giving his entire time to his new work. The election of directors also took place as follows: George E. Kinzle, Leo Yager, S. E. Hite, E. X. Ehinger and Herman F. Ehinger. The directors organized immediately and elected the following men: George E. Kinzle, president and manager; Leo Yager, vice president; Herman F. Ehinger, secretary, and E. X. Ehinger treasurer.

Ed R. Behlmer, of Sunman, has purchased both of the telephone companies operating in that town, the exchange and the Sunman system of the Southern Telephone Company and the

Farmers' Telephone Exchange of Sunman. These two companies will now be consolidated under one management, leading to the dismissal of the petition of the Farmers' Telephone Exchange for connections with the Southern Indiana Telephone Company and the Batesville Telephone Company.

Telephone patrons at Elwood are protesting against another contemplated increase in rates.

The Eastern Indiana Telephone Company recently petitioned the public service commission for authority to put into effect a new schedule of rates to supplant federal established rates now in effect, and due to expire December 1. The petition asks that the schedule be made effective at Winchester, Lynn, Fountain City, Farmland, Redkey, Ridgeville, Saratoga and Parker. The proposed rates are: Business, individual, $2.75; two-party, $2.25; residence, individual, $2; two-party, $1.50; rural, business $2.75; residence, $1.75.

The Chicago Telephone Company will be asked to discontinue the new rate schedule which was put into operation in Hammond while the government was operating the system. A number of increases were made in the rates and since the postal department relinquished control of the lines no reduction has been made. A resolution instructing the legal department to call the company's attention to the matter was introduced in the Hammond council and carried unanimously.

The Franklin Telephone Company at Franklin has petitioned the public service commission for permission to make permanent the schedule of telephone rates authorized by the federal telephone administration. The primary rates are: business telephone, $3 a month; rural and residence telephones, $2 a month.

The Lebanon Telephone Company has dismissed its petition for higher rates.

The public service commission recently issued an order requiring the Seymour Mutual Telephone Company to establish a direct toll line connection between Seymour and Crothersville on or before January 1. The commission some time back ordered the line established on or before June 1, 1918, but owing to the war conditions the company complained that it could not do so.

At a meeting of the directors of the Anderson Chamber of Commerce recently a majority of the men present opposed the proposed raise in telephone rates at Anderson with the present service. To represent the city at a hearing on the telephone petition a committee was appointed with the following members: D. W. Patterson, Joseph Essington and E. F. Creager.

The Seymour Mutual Telephone Company at Seymour recently filed a claim for $30,000, which amount represents the loss to the company while the plant was under government control.

Within a short time public hearings will be held by the public service commission on the telephone rates of Muncie and virtually all the larger exchanges in the state. Before December 1, when the federal wire control rates expire, all the rates of the various companies will be reviewed.

The petition of the Home Telephone Company for the approval of a new schedule of rates now in effect at Portland has been prepared and will be filed at once with the public service commission at Indianapolis. The new schedule of rates, in some cases making an increase of 60 per cent was the basis of a recent telephone fight which was compromised by the submission of the case to the public service commission.

IOWA

The Mutual Telephone Company of Marengo has been combined with the Marengo Telephone Company.

The rural telephone companies centering at Titonka are forming an organization to install and operate their own switchboard in that village. E. J. Van Ness is their lawyer. Former Supervisor L. Oesterriecher has been elected president.

KANSAS

The Kansas Utilities Commission held a hearing at the state house in Topeka recently on an application of the Northeast Telephone Company for permission to increase its telephone rates at Horton.

The telephone company at Garden City is erecting a new plant to cost $150,000.

The Arma Telephone Company commenced to rebuild its line and put in single service wires for patrons desiring them. Mr. Coles, who recently purchased the line, says that the system will be entirely rebuilt. New poles will be installed and single and double service wires will be put up, besides many other alterations, that will bring the system up fully to the standard in every particular. Before the fall season closes the company expects to build a brick exchange building along modern lines.

KENTUCKY

The Central Home Telephone and Telegraph Company is busily engaged building a new No. 10 copper toll line from Paris to Frankfort. This work was commenced on the Paris end and a large force of plant men are now working out of Paris on the Georgetown pike. This will be a through line for the purpose of establishing a more direct connection with Frankfort and points west of Frankfort, and will tend to relieve congested traffic which at the present time is routed through Lexington. This line is expected to be completed and thrown open to the public by December 1, this year.

Trace Fork Home Telephone Company, Stillwater, with a capital of $4500, has been incorporated by J. W. Rose, G. B. Rose and Herman Tyra.

Riverside Telephone Company, Riverside; capital $925; incorporated by L. A. Elkin, J. H. Beales and W. L. Cross.

The Independent Long Distance Telephone Company, of Louisville, filed an application with the State Railroad Commission asking that the company be granted permission to continue in effect the increased rates promulgated by Postmaster General Burleson.

MICHIGAN

The recent order of the Union Telephone Company discontinuing free communications between exchanges has aroused the patrons of the company at Muir and Lyons. These towns are situated only a mile apart and the people nave never been accustomed to paying extra toll as their business and social interests are closely identified.

Although Owosso is included in the order of the public utilities commission fixing telephone rates, the rates will not be changed, it is announced by L. L. Conn, secretary of the Union Telephone Company, which is now the only one operating in Owosso. The Burleson rates, which have been in effect for some months, will continue, he said. The rates are $36 for a business phone, $24 for a single party residence line $21 for a two-party residence line and $18 for a three party residence line. Farm lines within a radius of six miles are also $18.

The Bell Telephone Company at Bay City has leased the offices in the rear of the Peoples Commercial and Savings bank and will move its commercial department to that location just as soon as the new offices can be equipped.

One of the most welcome announcements in years for the people of the

Saginaw valley is that of the agreement between the Michigan State and Valley Home Telephone Companies by which the former will take over the property of the latter and operate as one system, eliminating dual service.

Subscribers to the Michigan State Telephone Company in 182 cities, towns and villages in Michigan are to enjoy lower rentals, tolls and charges, under an order issued recently by the Michigan Public Utilities Commission. Rates fixed on this order are temporary to serve until a permanent order can be issued.

The United Home Telephone Company in Muskegon is asking for an increase in rates. The increase over the present schedule is as follows: Individual business, $4.00 a month, present rate, $3.00; two party business, $3.00 a month, present rate, $2.00 a month; individual residence, $2.50 a month, present rate $2.00 a month; two party residence, $2.00 a month; present rate $1.67 a month; four party residence $1.66 a month, present rate $1.33 a month.

Nine hundred telephone users in St. Joseph and 1,700 subscribers in Benton Harbor, making a total of 2,600 in both cities, will have their telephone rates reduced as a result of the state ruling recently fixing a new and lower schedule of temporary charges pending a thorough investigation of the Michigan State Telephone Company's condition and affairs. There are approximately 275 business and 625 residence telephones which will be taxed under the new rates in St. Joseph and, 500 business and 1,200 residence telephones in Benton Harbor.

The Michigan State Telephone Company recently filed with the public utilities commission an application for a general increase of rates for service in Detroit. This is the first action taken by a Michigan telephone company to ask higher rates than were fixed temporarily some time ago when the so-called Burleson rates were set aside by the commission.

MINNESOTA

The Farmers' Club of Normanna township is preparing a petition to present to the county board at its next meeting asking for authority to build a rural telephone line in that township.

The Local Electric Telephone Company of Redwood Falls has purchased the Tri-State plant in that city. The capital stock of the Redwood Falls Company will be increased from $17,550 to $30,000. The Tri-State will continue to maintain the long distance office.

The Farmer's Mutual Telephone Company of Glendon, has made arrangements with the Iowa Telephone Company which will enable patrons to enjoy the advantages of toll line connections.

The Electric Telephone Company has started the work for laying the cable for the underground telephone system for the villages of Buffalo Lake and Stewart.

MISSOURI

Notice of the increase of the capital stock of the Capital City Telephone Company at Jefferson City was filed with Recorder Linhardt recently. The stock is increased from $75,000 to $125,000. The increased capital represents improvements made on the plant for the past few years and is in conformity with the value placed on the company's lines by the engineers and accountants of the Public Service Commission.

The State Utilities Commission refused to allow the Seneca Telephone Company to raise its rate asked for in a petition before that board. The rates charged by the local company in the past will remain in effect.

MONTANA

The state public utilities commission at Helena temporarily approved the rates put in force by Postmaster General Burleson prior to June of this year and called a hearing for November 24, when the Mountain States Telephone and Telegraph Company must appear and justify the rates, which are in advance of those of peace time.

NEBRASKA

The Arlington Telephone Company has made application with the state railway commission for an increase of 25 cents on each telephone.

McCook people are generally signing a petition asking the Nebraska Telephone Company to place their wires underground in the paving districts of the city. C. H. Harman is circulating the petition and it will be sent to the general offices for action. McCook people are spending money liberally in paving and other improvements to the city and it is desired that the telephone company should co-operate in this movement by placing its wires underground in the paving districts.

Applications of fifty telephone companies in Nebraska for permission to increase rates are now before the state railway commission. The commission has heard a number of these cases and has them under advisement.

The telephone company at Alvo, it is charged, has doubled its telephone rates without asking permission of the state railway commission, and the Murdock Telephone Company is reported to have refused to put in an accounting system after being ordered so to do by the commission. Both companies have been cited to appear before the commission and explain.

NEW YORK

Telephone rates in New York city will be reduced 8 per cent beginning October 1. No subscriber will be required to pay more than 5 cents for a five-minute talk.

OHIO

Investigation of complaints regarding excess telephone calls is to be made by the state public utilities commission. Assistant Director of Law Marshall appeared before the utilities commission to protest against the practice of the Cleveland Telephone Company in charging 4 and one-half cents for each call in excess of a certain number, the scale being based on the type of service furnished. Marshall asked that the telephone company be required to install meters to register all calls.

Contractors have begun work on a new building for the Van Wert Home Telephone Company. The building will cost approximately $30,000.

The Ohio State Telephone Company filed with the state utilities commission recently schedules requesting increase of rates at Dayton, Miamisburg, Bloomingburg, Jeffersonville and New Holland.

Telephone managers and lawyers met at Columbus recently from all over Ohio urging the state utilities commission to continue permitting them to charge patrons $3.50 for installing a telephone and $1.50 for moving one.

Announcement was made recently that the patrons of the Hamilton Home Telephone Company will be given long-distance service into Cincinnati over the lines of the Cincinnati and Suburban Telephone Company lines. The Bell has acquired the Home property and finally completed the connection between the two exchanges.

Improvements now under way and planned by the Ohio State Telephone Company in Canton will cost approximately $250,000. The improvements are expected to be completed by January 1 and will eliminate the subexchanges and provide adequate cable facilities for all districts of the city. New and larger switch-boards are now

being tested preparatory to their installation.

If the village council of Westerville has its way there will be only one telephone system there. The solicitor, W. B. Cockerell, has been ordered to draft resolutions for a consolidation to be sent to the two companies now operating in the village.

Effective September 1, Bell telephone rates at Lancaster were advanced 15 per cent, the third increase in a year.

If the state utilities commission grants the request of the Ohio State Telephone Company, business telephone rates at Dayton will be advanced from $54 to $60 a year. Residence rates are not affected. New Bell telephone rates at Akron will stand, the commission refusing to suspend the advance.

The council of Bowling Green sent a petition to the state utilities commission, asking that an inspector be sent to Bowling Green to investigate the poor telephone service. Within the last month the two telephone companies consolidated.

SOUTH DAKOTA

Whether telephone companies, both Bell system and Independent will continue to operate in South Dakota under the Burleson rates after December 1 is a question that the South Dakota Railway Commission now has under consideration.

The managers of the Battle Creek Farmers' Telephone Company, which owns several rural lines in the vicinity of Rutland have decided to install a system in Rutland, which will be connected with the rural lines.

TEXAS

The Southwestern Telephone Company at Houston has asked the mayor for an extension of time in which to prepare an answer to the city's inquiry on service charges. The city wants to know why the company is charging a service rate of $3 for moving a telephone from house to house, and a rate of $1 for changing a subscriber's name in the telephone directory. It is contended that this practice violates the city ordinance defining rates and other matters affecting the telephone company's operations.

Officials of the Southwestern Telegraph and Telephone Company at Ranger are inspecting the local plant and system preparatory to installing the modern new $100,000 plant which was tentatively agreed upon by the company and city officials several weeks ago. According to the officials, the present system is so inadequate and so improvisedly built up that it will be necessary to build an entirely new system, with probably 3,000 sets, reaching all the important offices, buildings, residences and adjacent oil camps.

The Southwestern Telegraph and Telephone Company at Fort Worth will endeavor to build for better service. The program calls for $461,000 to be spent on local telephone service. About $40,000 of this amount will go toward underground trunk facilities, while $15,000 is now being spent in adding another story to the one-story wing on the south side of the Lamar exchange. This new floor will be used for additional long distance service.

Application for an injunction to restrain the city commission from putting into effect the ordinance passed on August 1 restoring rates to the pre-war basis was filed in the United States District Court recently by the Southwestern Telegraph and Telephone Company at Corpus Christi.

Application for a temporary injunction to restrain the city of Houston from putting into effect the present city ordinance prescribing telephone rates at $2 and $5 monthly was filed in the United States Court by the Southwestern Telegraph and Telephone Company.

Mayor Blackburn states that Superintendent Maas of the Southwestern Telephone Company of Dallas has informed him that the company will seek to collect only amounts allowed under the old contract for service in Gainesville, and that the local office has been so notified. According to order of the city council the old rates were restored August 1.

VIRGINIA

The Cane Creek Telephone and Light Company has been incorporated at Fairview with $10,000 capital stock.

WASHINGTON

C. E. Jolly, local manager of the Pacific Telephone and Telegraph Company at Yakima, announced that the company would spend $62,900 in extensions and betterments to the plant and that work is to begin in three weeks and be completed within six months if possible. Materials the company was not able to obtain during the war period, have been ordered. The plans are to build 4,600 feet of trench underground and a conduct to carry 12,000 feet of cable, and extend the aerial pole lines 5.42 miles, adding 36,700 miles of aerial cable to the distributing system.

WISCONSIN

The Portage Telephone Company has started on improvements to the plant in Portage that will approximate $15,000. About half of this amount will be spent for local labor and the remainder for material. Portage has 1,400 telephones now connected with the company's switchboard.

The Burlington, Rochester & Kansasville Telephone Company has petitioned the railroad commission for authority to raise the rates on fifteen-party line service from 1 to $1.50 a month, and rates for other service accordingly, asserting that the present rate will not earn a fair return on the property.

Patrons of the rural telephone lines in western Wisconsin are stirred over the ruling of the railroad commission, effective September 1, that limits free exchange service to the immediate community in which a parton resides. Toll rates are in effect if one desires to talk to a farmer who resides two or three miles away. Under the old system, patrons could talk to friends over a wide expanse of country at a flat monthly rate. Another hearing will be asked of the commission in an effort to modify the ruling.

The Bangor Telephone Company has made application to the railroad commission for authority to increase its rates on account of the higher cost of labor, materials and the general increase in the cost of doing business. The new rates asked for are as follows: Business telephones in village, $2.25, less 25 cents rebate if paid in current month. One party line, $2.00, less 25 cents rebate. Four-party line, $1.50, less 25 cents rebate. Rural telephones per quarter, $5.25 less 75 cents if paid first quarter; 50 cents rebate if paid second quarter; 25 cents rebate if paid third quarter.

Rural residence telephones will cost $18 per year and rural business telephones $21 per year in Neosho and Hustiford because of higher rates recently granted the Eureka Telephone Company by the state railroad Commission. The increase followed an appeal before the commission July 15, when President William Wegwert, Woodland, and Secretary Martin McCollow of Neosho testified.

Hearing of the petition of the La Crosse Inter Urban Telephone Company for an increase in rates, operating exchanges at La Crosse, West Salem, Barre Mills, Viola, Readstown and De Soto, will be held at Madison before the Railroad Commission of Wisconsin on October 3. The utility is asking for an increase in the minimum toll charge from five to ten cents, and from two cents to five cents for each additional minute beyond the ten minute period.